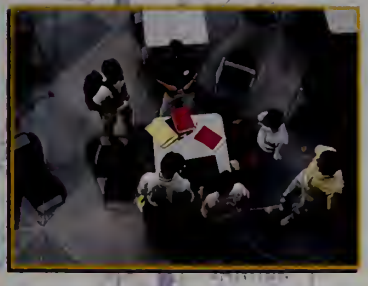
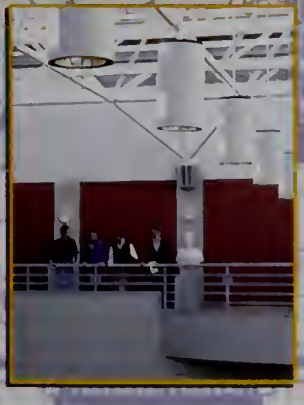
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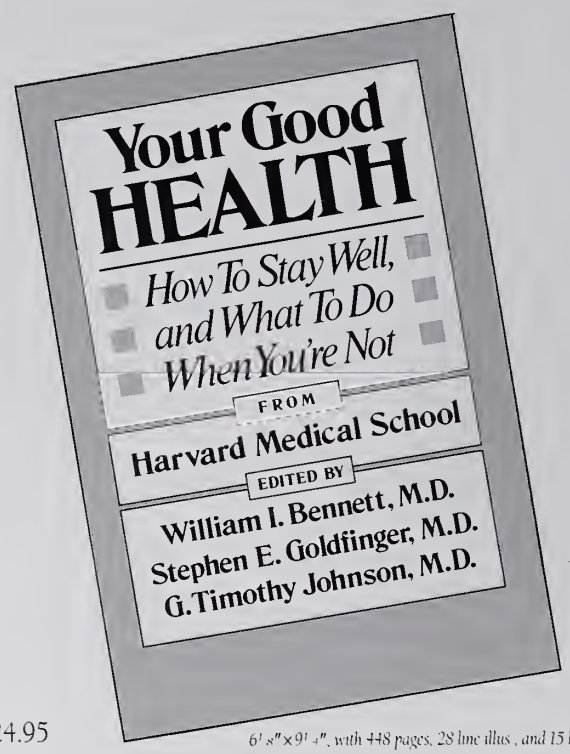
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Cover: Yesterday's blueprints are today's reality. The photographs, by Ulrike Welsch, show the outside of the new Medical Education Center from Longwood Avenue and two views from the center's atrium.

INSIDE H.M.A.B.

That ancient adage *plus ça change, plus c'est la même chose* no longer holds. The Common Pathway is not the same thing at all. Nonetheless it benefits from the New Pathway and from HST and pathways that lead all the way back to a shade tree in Cos.

The president of Harvard sets the tone in his remarks made at the dedication of the new Medical Education Center. A new atrium is one thing, teaching or learning is another— but related. Jim Adelstein and Dan Federman tell us what deans think; Octo Barnett and Pete Coggins, how teachers teach; Emily Koumans and Elana Doering, how students learn. You should know that this year all students have been assigned to one of five societies. In these pages you will meet the master of each.

No issue is without collateral bits designed to instruct, illuminate, and sometimes amuse. John Stoeckle '47 reviews a book by Steve Hoffmann '81 and includes almost every other Harvard graduate who has scratched the itch to write. Steve Seidel '89 looks at oncology through the patient's eye. Nancy Bucher tells a personal story of her hero, Dr. Aub— Joe Aub to many— and the Huntington. Russell Elkinton '37 reflects on the generics of fifty years out.

To lift a phrase from that recent English sage, P.G. Wodehouse, education is set out like a prawn in aspic.

—Gordon Scannell

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ALUMNI BULLETIN

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LETTERS

Taking Issue

Burr's remarks in the Spring issue of the *Bulletin* were much more to the point than the explanations of Reardon and Gutheil. The notion that the jury system "works" because of some magical perception of the truth with which the jurors are miraculously endowed, is simply wishful thinking. It would be more truthful to admit that the jury system is outdated, and that it has largely been abandoned in other English-speaking countries.

—Bruce A. Harris, Jr. '43A

The two articles on Doctors in Court in the Spring *Bulletin* were timely. They clearly defined the difference between a proper medical expert and a medical hired gun. The authors might also have noted that a physician has at least as much obligation to patients as to colleagues and that there is an ethical duty to limit the medical activities of the grossly negligent physician.

Dr. Gutheil is apparently unaware that in some states, including California, medical experts serve the court in a nonpartisan way. For thirty years, I have been one of the "independent examiners" appointed by the California Workers' Compensation Appeals Board to provide impartial evaluation of patients who claim to have incurred job-related injuries or diseases. My services have also been in demand by both defense and plaintiff attorneys in industrial cases first, and then later in regular tort cases, including medical malpractice.

In the two excellent articles, I would emphasize:

1. A medical specialist should not express an opinion outside his own field of special knowledge. Once an expert gives an opinion in a medical specialty other than his own, he is no longer an expert.

2. Care should be used in distinguishing procedures which are below accepted standards from possible errors in judgment. What one specialist considers a judgmental error may be acceptable procedure to others in the field, who may so testify.

3. In a malpractice suit, if a medical expert explains that the poor result of treatment or surgery was unavoidable, not the result of malpractice, both plaintiff and attorney may be resentful. However, the litigants should understand that the unwelcome but objective opinion of the expert can prevent futile expenditure of time and money in pursuit of invalid claims.

4. When a medical witness testifies in a jury trial, he should express himself simply and carefully, avoiding all technical terms. Members of the jury rarely have any medical background, and some may even have had very little ordinary education.

If I have used the masculine pronoun in the preceding, it is not because of male chauvinism, but a result of the Harvard Medical School policy in my time that only males be admitted. I have worked both with and against some excellent female lawyers, but all the medical experts in the Los Angeles area seem to be male.

—Theodore B. Massell '31

The articles on "Expert Testimony: Doctors in Court" in the Spring *Bulletin* were a bit late considering that the litigation flood tide has been running for a decade. Possibly most physicians, through "risk prevention" programs, witnessing for colleagues, or being sued have had the course in deviant psychology and theatre arts necessary for proper understanding of legal "thinking" and methods. Even as an introduction to this "through the looking glass combat zone," the insights were shallow, self-serving, and in one instance side-splittingly inane. Your lawyer's (Mr. Reardon's) assertion that "juries have a real ability to know when somebody is telling the whole truth" reveals a mind that is either dull, dissembling, or detached from reality. With few exceptions, winning in court means having the best lawyer (not right or truth) on your side. It is no different from hiring the best surgeon for a serious operation.

Dr. Gutheil calls an opposing expert a "hired gun" and Debra Trione reflects that physicians are encouraged "to twist the facts" or "take whichever side will pay the most." These remarks apply more to lawyers whose ethical responsibility to the client means using or suppressing fact, fantasy, or science.

It is regrettable to find that the simple solution to these problems has not been discovered by the keen minds now responsible for the HMS tradition of excellence. Read the article "Funding Student Aid" and understand that the average "debt at graduation in 1986 was $55,000." In an era when medical schools need money, it takes no genius to see that some part of the experts' fees belong to the dean. All mine, for example, are paid directly to Johns Hopkins and other educational rungs mainly for scholarship and research endowments. It is sobering to consider that these pay-

MOVING?

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ments will outlive me and are a more certain tie to immortality than my children.

Why is this simple "not-for-profit" solution to a problem in medical ethics so little practiced? Chalk it up to hyperfunctioning greed and to hypofunctioning common sense and troubleshooting skills.

—Paul S. Wheeler '61

If only the solution to winning jury trials was as simple as retaining the "best" lawyer. Unfortunately individuals, such as Dr. Wheeler [above], *generally define the best lawyer in retrospect. If the case is won, the lawyer is the best. If the case is lost, the lawyer "blew it." The underlying premise is clear. The doctor is never at fault. Winning and losing is the lawyer's responsibility and not the responsibility of the doctor performing the medical act.*

I do not share Dr. Wheeler's arrogant opinion that the average American citizen can be so easily deceived by courtroom theatrics. If this were the case, billion-dollar insurance companies would simply retain the best "showman" and refuse to settle even the most egregious suits.

—Frank E. Reardon
Attorney at Law

The Way It Was

My stepmother, Mrs. George P. Berry, has just sent me the Spring *Bulletin*—"Portrait of a Dean." It was a wonderful, overwhelming joy to see this many-sided picture of my father. Many thanks for the magnificent tribute.

—Caroline Berry Laporte

At our recent tenth reunion, I couldn't help but remember the first time we arrived at the quadrangle. My memory of the classmates who converged from near and far wondering whether they were ready for the challenges ahead became more vivid as I met familiar smiles.

Building E—my first impression had been that these buildings were rather unimaginatively named—brought back memories of our Gross Anatomy class and of Butch, my cadaveric patient. It also reminded me of the time a classmate, mistakenly thinking I would dread applying my scalpel to Butch, offered to dissect the head and neck for me in exchange for button-sewing on his shirts. When the day for dissection came, that classmate was so overcome by formaldehyde fumes that he sorely needed frequent trips outside to catch the fresh, crisp winter air. I remember vividly, too, how we were shunned by the second-year students of the Class of 1976 in the dining room of Vanderbilt Hall, because our clothes reeked of formaldehyde fumes.

My class was there during the year of the streakers and, appropriately, an "anonymous" streaker streaked through our gross anatomy class shortly after the skeleton, which had stood motionless for the entire six weeks of class, suddenly moved across to the podium, attempting to take over the class from Dr. Raviola.

Those of us with a soft spot for dogs also remembered Andrew, the golden retriever guarding Building A. Things being what they are, he had at times abandoned his post to retrieve a few enticing sticks. As I wandered through the quad, I could almost see him there like a wise old owl with his head held high, watching.

Dogs and buildings aside, our immediate worries back then were to finish school and do well. Those of us who were single certainly didn't understand the stresses associated with having a family; we had only ourselves to worry about. The inevitable changes and challenges in our lives have set our priorities in perspective.

Leafing through our class report, the impact of children was obvious. One classmate stated, "the birth of our first daughter... fulfilled that void... most people don't realize is there until they have a child." Another stated that, "With the birth of my daughter, my domestication is complete. Her joyful exuberance serves as a constant reminder... of how empty our lives were before we finally grew up." And yet another, with the birth of his daughter wrote, "Now I understand all the hoopla my classmates have made in alumni reports! She has been a joy... and a great reminder of life's priorities."

The other striking point in our class reports was their reference to taking time "to smell those wonderful roses." One person remarked that he "used to grumble at the 'hearts and flowers' pap that appeared in the alumni news, but I'm now a zealous convert." For all the years of burying ourselves in the pursuit of our goals, we have gradually come to realize that there are other important things for which we need to set aside time—not merely for the good of our souls, but for the good of our patients, families, and society.

Five years from now, what great insights are we going to discover for ourselves and our loved ones? Will we be as malleable as we seem to be at this juncture of our lives? I wait with bated breath to hear from my classmates.

—Kwan Kew Lai '77

PULSE

Leadership Changes at McLean Hospital

Shervert H. Frazier succeeded Francis de Marneffe as director and chief executive officer of McLean Hospital in July. De Marneffe retired to become chief executive officer of McLean Health Services, Inc., a for-profit joint venture of McLean and American Medical International (AMI).

Frazier has been psychiatrist-in-chief at McLean and HMS professor of psychiatry since 1972, responsibilities he will continue to hold in addition to his new duties. From 1984-86 he took a leave of absence to serve as director of the National Institute of Mental Health. There he initiated a national plan for research on schizophrenia, led a task force on youth suicide, and created a public awareness campaign on depression and its treatment. Since he returned to McLean, Frazier has initiated new services, expanded research funding, and helped recruit nationally known professionals.



Shervert H. Frazier, new director of McLean Hospital



Francis de Marneffe

His psychiatric career has spanned 35 years and includes appointments at Columbia's College of Physicians and Surgeons, the Mayo Clinic, and Baylor University College of Medicine. Frazier was also director of the Houston State Psychiatric Association and commissioner of mental health and mental retardation for the state of Texas.

De Marneffe has been at McLean Hospital for 35 years, 25 as general director. Upon retirement, the hospital's board of trustees commended him for his "tireless dedication to excellence in psychiatry coupled with his strong business acumen," and designated him general director *emeritus*. A $7 million cafeteria/library facility now under construction will be named in his honor.

De Marneffe is credited with guiding the growth of McLean's staff, physical plant, community service, and research programs. He was also instrumental in striking the innovative deal with AMI that helped improve the hospital's financial condition through equal partnership in a for-profit venture. McLean Health Services, Inc. provides mental health services to other hospitals, HMOs, corporations, and communities. □

Cancer Survivor Celebration

"It takes a long time to know whether you've cured someone from cancer, and less time to know whether you haven't," explained I. Craig Hendersen, director of the breast evaluation center at Dana-Farber Cancer Institute, to an audience of cancer survivors and DFCI staff. The occasion was the institute's 40th anniversary celebration and cancer survivor reunion held at DFCI and on the HMS quadrangle on August 29.

Over 200 patients who had survived cancer for more than five years flocked from around the country to celebrate a "Heritage of Hope" with their families and the DFCI medical staff. Survivors came in all ages, shapes, and sizes, including some from the original group treated in the late '40s and early '50s, soon after DFCI opened. Scheduled events included morning workshops on specific kinds of cancer, and an afternoon of outdoor festivities complete with music, a trained monkey, jugglers, acrobats, and discussions of general interest.

For the cancer survivors, it was a day of joy, education, pain, and catharsis. For the staff it was a day of happy reunions and a reminder of the very human reasons for striving to cure or prevent all forms of cancer.



Former Hodgkin's patient, Rick Candels, and wife Heather

DFCI PHOTOS BY JOHN LAUERMAN



Acrobatics at the DFCI reunion

Appropriate to an anniversary celebration, the program offered some historical perspective. Prior to 1947, when Sidney Farber founded the DFCI, a diagnosis of cancer was an almost certain sentence of death. The medical community was skeptical of Farber's claim that the proper combination of drugs could cure childhood leukemia. When he showed that the drug aminopterin could produce at least short-lived remission, he was accused of prolonging the disease and aggravating its course with the dreadful side effects of the drug. But Farber succeeded in showing for the first time that chemotherapy offered hope where none had existed before.

Today, DFCI boasts one of the largest groups of pediatric cancer survivors. Due a least in part to refinements in chemotherapy techniques pioneered at Dana-Farber, 90 percent of children treated today for acute lymphocytic leukemia (ALL) are "cured."

"We're in unexplored waters now," said Stephen Sallan, associate professor of pediatrics, in a workshop for survivors of ALL. "The sun is still shining, but no one has been followed out this far yet. We still don't know what kind of relapse rate to expect." Other workshops, each moderated by an expert from DFCI, covered lymphomas and Hodgkin's disease, breast cancer, testicular cancer, leukemias, and other adult cancers—each with its own story of clinical and research success.

During afternoon activities, Rick Crandels confided how, in 1958 at the age of four, he had been diagnosed with Hodgkin's disease, which was considered more serious then than it is today. The program at the Farber was experimental and he came here specifically for that. Now he feels lucky. "This is an intensely personal thing," says Crandels about the reunion. "It all comes down to tremendous examples of courage."

Officials at Dana-Farber pointed out that emotional and pragmatic issues surrounding the cancer and rehabilitation experience also need to be addressed: job discrimination, insurance discrimination, sexual identity, and family impact. "Don't quote me on a low day," said one 26-year-old veteran of two bouts with cancer, "but as far as preparing me to deal with the realities of life, as well as teaching me to appreciate that life, cancer is one of the best traumas that could have happened to me." □

Class Acts

They come from 67 different colleges, in 36 states and 8 different countries, including Canada, China, Greece, Iran, Libya, Saudi Arabia, Venezuela, and the Virgin Islands. Among them is a national weightlifting champion, a screenwriter, and a Rhodes scholar. The 108 men and 56 women in the HMS entering Class of 1991 were chosen from an applicant pool of 2635.

Before reaching these hallowed halls, they had already proven their academic prowess. Forty-six percent of the incoming class had achieved undergraduate grade point averages

Bird's Eye View

What's a hawk without its eyes? Carmen Puliafito '77, director of Massachusetts Eye and Ear Infirmary's Morse Laser Center, used a YAG laser to perform a successful optical iridectomy on the blind left eye of this red-tailed hawk. The story attracted widespread media attention. The hawk, originally brought to Tufts Wildlife Clinic, couldn't have survived in the wild without binocular vision. Laser treatment was his only hope, so the veterinary ophthalmologists turned to Puliafito for help. At this writing, the hawk, named Neeknah, is in Pennsylvania for "rehabilitation." He can now see, and when he is ready to hunt again, he'll be released. □



of 3.75 or better. Their averaged MCAT scores were from two to four points higher than the national pool, depending on the subject tested. Slightly more than 71 percent were undergraduate science majors, and 15 percent majored in humanities. A humanities major had a slightly better chance of acceptance than a student who had majored in science.

As usual, Harvard/Radcliffe claims the largest number of students (42, or one-quarter, of the class). Yale comes in second with 10, and Dartmouth and Stanford tie for third with 6 each. All told, the class includes only 1 in 16 who applied.

The Class of 1991 ranges in age from 20 to 37, but 22-year-olds comprise 40 percent of the class. Thirty-one members of this class are 25 or older. As in previous years, a large number of accepted applicants chose to defer matriculation in order to complete projects they had already begun. The activities these students are currently involved in include competing in the "Iron Man" triathalon, working in Bangladesh on an overseas development fellowship, and completing academic research on Rhodes, Marshall, or Rotary scholarships.

The Class of 1991 includes 29 Asian Pacific Islanders, 14 Black Americans, 5 Mexican Americans, 2 Puerto Ricans, and 1 Native American. Men outnumbered women two to one in both application pool and matriculating class.

The number of applicants to HMS and medical schools nationwide has declined sharply over the last 10 years. This year alone saw a 10 percent decline in total number of applications in all categories except Asian Pacific Islanders. In addition, a larger number of students (90) declined the offer of admission from HMS this year than at any other time in the last 10 years.

"In spite of the falling application pool and the increased number of students choosing to go elsewhere, HMS has no trouble matriculating an intellectually and personally outstanding student body," says Gerald S. Foster '51, director of admissions. Foster speculates that the rising cost of medical school, and the uncertain nature of financial remuneration after graduation are turning many away.

"These are warning signals for the future. The drop in applications hasn't affected us yet, but many of us are concerned that it may become an acute problem in the years ahead." □

PHOTO BY SHARON BRAY



Philip Leder

Leder Gets Lasker

Philip Leder '60, John Emory Andrus Professor and chairman of the department of genetics at HMS, was named a co-recipient of the 1987 Albert Lasker Basic Medical Research Award. Leder was cited for "elegant studies of the genetic basis of antibody diversity and the role of genetic rearrangement in carcinogenesis."

Molecular biologists Susumu Tonegawa, of MIT, and Leroy Hood, of the California Institute of Technology, share the award with Leder. (Tonegawa also won the 1987 Nobel Prize in physiology and medicine.) Morgens Schou, of the Aarhus University Psychiatric Institute of Denmark, received the Lasker Clinical Research Award.

Leder has made several landmark discoveries in molecular genetics. Breakthroughs have come from his work in the early '60s in Marshall Nirenberg's laboratory deciphering the genetic code, and from research investigating the genetics behind the formation of diverse antibodies. Other important work has ranged from cloning the first mammalian gene to his more recent findings about the relationship of oncogene regulation to cancer.

The model for explaining antibody diversity evolved from discoveries by all three Lasker Basic Medical Research awardees. Together their work defined how it is possible for an organism to synthesize what Leder says is the "statistical possibility of creating about 18 billion unique antibody molecules."

Leder was graduated from Harvard College in 1956 and from HMS in 1960. He spent the first 20 years of his professional career at the National Institutes of Health (NIH). His many honors include elected membership in the National Academy of Sciences, the American Academy of Arts and Science, and the Institute of Medicine.

Leder and the three other award winners lectured at a scientific symposium November 18 at Rockefeller University in New York. Mary Lasker, president of the foundation, presented the awards on November 20. □



CAMPAIGN REPORT

Philadelphia Story

A kickoff party for the first regional effort of the Campaign for the Third Century of Harvard Medicine was held on November 5 at the Philadephia Four Season's Hotel. Gordon Schwartz '60, who is regional chairman, welcomed Philadephia-area alumni, alumni parents, and others to the cocktail party. Daniel Federman '53, dean for students and alumni, and Perry Culver '41, co-chairman of the national alumni committee, were also on hand to officially welcome guests.



Gordon Schwartz

The school started the regional campaign program in the spring of 1987 to bring the goals of the campaign to the attention of alumni around the country through 20 regional events. When recruitment for the regional committees is complete, over 400 alumni will be serving. These volunteers will ask other alumni to join them in contributing to the campaign.

Judy King, who directs the regional campaign program in the HMS office of resource development, cites three specific goals of the school's campaign:

Vanderbilt Hall. Now 60 years old, Vanderbilt needs $7 million to renovate and update student rooms, wiring, plumbing, and athletic facilities. "It is interesting to note," says King, "that it was originally the alumni's idea to build Vanderbilt, and they provided the initial funds." Harold S. Vanderbilt came through with money to complete the building after it was already under construction. This time around, everyone who donates $10,000 or more to this project will be designated a Vanderbilt Hall Associate and his/her name will appear on a front-hall plaque. There are also opportunities to name student rooms or suites.

Financial aid. To decrease student debt after graduation and maintain a "needs blind" admission policy, HMS must raise $16 million for endowed scholarships and loan funds. It is possible to name scholarships and revolving loan funds for gifts of $10,000 or more.

Unrestricted funds. The medical school also seeks an unrestricted $5 million in order to have the financial flexibility to respond to its unanticipated needs.

Committees have already been formed for the Los Angeles and San Diego regions, led respectively by Loren MacKinney '45 and Eugene Appel '66. In 1988 campaigns will also be launched in Boston and New York City, where the largest numbers of alumni reside. In the next three years, 15 more cities will also host regional campaign events. □

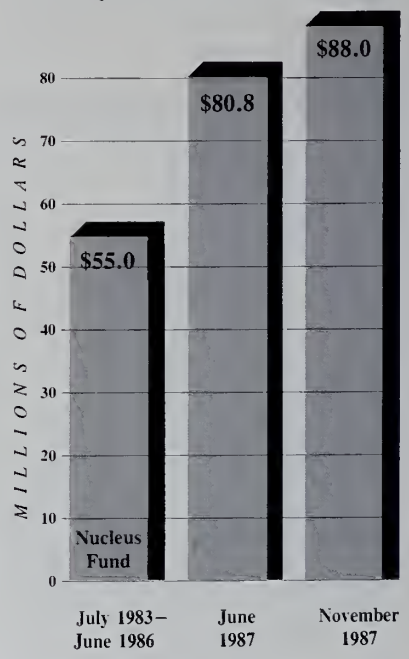


Loren MacKinney



Eugene Appel

Campaign for the Third Century of Harvard Medicine



The Campaign reached $88.0 million in gifts and commitments as of November 30, 1987. The Campaign goal is $185 million.

BOOK MARKS

Physicians Train and Tell

UNDER THE ETHER DOME, by Stephen A. Hoffmann, Charles Scribner's Sons, New York, 1987.

by John D. Stoeckle

Under the Ether Dome is on learning to doctor—"a physician's apprenticeship at the MGH." Stephen A. Hoffman's experience is new; his theme, old. It is a theme that has attracted physician writers ever since residencies began at this old institution back in the 1850s. The literature on learning to doctor has been expanded and diversified not only by insiders like Hoffman, but by academic studies, policy reports, the popular media, and those recorded and unrecorded tales from the "other side"—patients. To understand Hoffman's achievement, one must see it in the larger context of its doctors-in-training genre.

Insider accounts of doctoring (and training for it) used to turn up in autobiographies of MDs, their perennial advice-guides to students, and their occasional contributions to hospital histories. These commentaries were usually brief, flat, and factual, about what residency should have been and what it was (those holy writs of scheduled rotations); or they were moral strictures about what the student-resident ought to do and "cultivate." Religion still drove the resident's commitment to the "sick poor" in their confined, almost monastic, hospital life.

As hospital work ran counter to the tradition of solo apprenticeship, public and professional support for the benefits of hospital training was argued often (as in R.C. Cabot's *Rewards and Training of a Physician*, 1918, and Osler's essays). But the resident's perspective was never addressed. In 1938, James Howard Means, chief of the MGH medical service, asked 23 of his former "house pupils" for recollections of their experiences. All of their accounts were factual and dry, describing only the physical plant and the procedures, tests, and treatments they performed—not what they thought or felt.

Yet writings by insiders gradually became more self-disclosing. W. Somerset Maugham's *The Summing Up* (1938) and William Carlos Williams' doctor stories of the 1930s praised the training experience for revealing insights about human nature. With the novel *Intern* (1965), Dr. X gave the residency experience a clearly subjective, fictional form.

Stories from social science outsiders studying medical training as the "socialization of the doctor" also appeared. These investigators used survey questionnaires, interviews, and participant observation to get facts from doctors-in-training at certain thinly-disguised medical schools and hospitals. They asked about early professional life: more often about students than residents, and about residents more often than practitioners. They wanted to know what kind of doctors the schools were turning out when specialization and technology alone seemed to define the nature of their training.

Emily Mumford's *Interns* (1970), about New York and Stamford Hospitals; Steve Miller's *Prescription for Leadership: Training for the Medical Elite* (1970), about Boston City Hospital; and R. Gordon McIntosh's "A Comparative Study of Clinical Training" (1969), about MGH, all addressed how residencies work and what residents do, but said little about how residents feel about doctoring.

Miller's study showed that residency was no different from "learning the ropes" in any other occupation; Mumford found residency culture distinctly separate from life in everyday practice; and McIntosh noted that residents valued therapeutic responsibility that generated intense motivation to solve clinical problems. Group analyses like these, not updated to reflect new residents and programs, go largely unread today. The one exception is Bosk's *Forgive and Remember* (1979), which looks at how a surgical staff handled the mistakes of its residents.

How does Stephen Hoffman's essay on his hospital life inform students, practitioners, and the interested public in the face of all this? Hoffman focuses on the experience of residency—on what he thought, felt, and did. His major topics are medical school, beginning training, the ICU, EW, on-call, and nurses (their interprofessional relationships and work).

Hoffman's text is highly personal, full of rich accounts of the everyday, ordinary stuff of hospitals, where residents begin work with the strangers who become their patients. He focuses on the traditional hospitalized sick and the machines at the bedside. Encounters with patients in the clinic are few. With both seriousness and wit, Hoffman records his elation, shame, and grief in caring for acutely ill and dying patients. He responds to the routines and rituals of rounds, reveals his initial transient terror at doing invasive acts (lines, tubes, sticks), discloses his fatigue from work pressures, and confesses his attempts to remain human and catch a little personal time. Hoffman doesn't mention his individual mentors—these days the whole clinical community contributes to the resident's development.

Hoffman also notes the high and low reactions of other residents to their experiences in the ICU. These he draws from the residents' "red book," a collective diary inaugurated by Ted Stern, the unit's psychiatric consultant. This diary was a safe place to learn the desperate sentiments of those who came before, and express one's own angst for those who came after. Doctors and patients, old and

young, can identify with the many sketches of clinical life Hoffman pulls from its pages.

Other chapters in Hoffman's book are different in both tone and substance. Those on medical ethics and education are about the necessity of combining the technical with the humane and on the dilemmas involved in promoting patient autonomy. The chapter on MGH history consists of brief vignettes about old and famous MGH/HMSers (from physician Jacob Bigelow to surgeon John Collins Warren, operating in the Ether Dome).

Hoffman is not the first HMS graduate and teaching hospital trainee to write about his experience in a self-examination style. Michael Crichton probably holds that honor with a sketch of MGH and its doctors-in-training through the lives of *Five Patients* (1970). What followed Crighton was a long list of writings about trainees by the trainees themselves, including Samuel Shem's *House of God* (1978) and Michelle Harrison's *Woman in Residence* (1982), both about Beth Israel Hospital.

House of God depicts training as a processing of bodies. A gritty account, it strips residents and staff of any moral attachment to their patients or each other. Shem's novel debunks both doctors and their ideals, such as the notion that therapeutic responsibility might require a sacrifice. One can hardly recognize in Shem's hospital the BIH that patients in Ruth Laub Coser's *Life in the Ward* (1962) characterized as "home away from home." And it's a far cry, too, from the close doctor/patient attachments Renee Fox observed on Ward F of Peter Bent Brigham Hospital in *Experiment Perilous* (1959).

Harrison's *Woman in Residence* is a diary of a working-mother/part-time resident who watches the ob/gyn system make decisions for women about interventions on their bodies. Harrison portrays both the trainee and her patients as victims—the trainee of demanding supervisors and rigid schedules, the patients of standardized treatment protocols.

HMS itself (and perhaps the anti-authoritarian '60s) inspired Charles LeBaron's *Gentle Vengeance* (1981)—an alienated story in which the professional school often fails to meet the sense of entitlement its privileged trainees expect. Then came Perri Klass' collection of essays, *A Not Entirely Benign Procedure* (1987), and most recently, Melvin Konner's *Becoming a Doctor* (1987). Still other popular hospital/doctor stories out of HMS are fictional, investigative, and confessional. From the old Free Hospital for Women, for example, came Florence Haseltine and Yvonne Yaw's *Woman Doctor* (1980), a standard account of interesting patients and a titillating tale of gender politics and sexual adventures, displaying the other side of do-good professionals.

From Mt. Auburn Hospital is the investigative, behind-the-scenes report of sociologist Marcia Millman, *The Unkindest Cut* (1977), which exposes the conflicts inherent in doctors working together and reports the scapegoating of "privates" by residents. Not to be overlooked is the recent essay by Leonard C. Groopman, "Medical Internship as Moral Education," about training at MGH.

Though we HMS clinicians have written more than our share, the genre of insider doctor accounts is not a purely local phenomenon. Bookstores in England are crowded with similar, though more fictional, accounts: Colin Douglas' *The Houseman's Tale* (1975) and *Bleeders Come First* (1979), Robert Clifford's *Not There, Doctor* (1978), and Peter Stott's *Milestones* (1983). And from every corner of this country many more volumes about MDs come from practitioners of all ages. Young doctors like Toni Martin (*How to Survive Medical School*, 1983) and students like Lorraine Dudley (*Student to Student Guide to the Hospital Wards*, 1987) write about "making it," while older doctors reminisce about the way things were.

Apart from insider accounts, the popular media provides a steady, daily portrayal of "docs" in movies (*Whose Life Is It Anyway?*), on TV ("St. Elsewhere" and so-called in-depth documentaries like Mike Wallace's "The 36-hour Day"), in comics, pop-psych magazines (*Psychology Today*), and in feature articles on the accomplishments of doctors in research and care. Then there are the oral histories people pass on to their friends—that unrecorded gossip about going to the doctor that the American public recounts after each of its 1.5 billion office visits and 37.2 million hospital admissions every year.

Given all these literary accounts, visual productions, and face-to-face

By and About Doctors

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encounters, everyone knows what doctors (even resident doctors) are like. Yet volumes continue to appear as members of our learned profession—even more than ministers, lawyers, or journalists—write about themselves, their journey into the profession, and their search for a lifetime of useful (and well-paid) work.

What are such resident/doctor writings all about? I believe these writings are more than reconstructions of clinical reality or the phenomenology of doctoring. Criticizing "the system," an old American tradition, is now a dominant theme in this literature on training. The modern perception is that training—the work itself and the supervision—can be exploitive. This perception is not unexpected. Doctors-in-training seem no longer motivated by the older moral ideals of service, but by a secular search to do socially valued work that also promises personal satisfaction.

Some of these accounts by doctors are classic, cathartic confessionals exorcising the bad behaviors and thoughts which doctors hide from both themselves and others in their pursuit of competence, caring, and selfless professionalism. Groopman's essay reports how those feelings develop and are managed in the therapeutic bureaucracy of the modern hospital. Klass' self-absorbed travelogue through HMS includes her candid personal asides.

Stephen Hoffman's book is also in this mode—he admits to anger beneath his proper acts. But his book is also something special, a celebratory volume on doctoring, a rare find in this era of doctor bashing and demoralized physicians. In his struggle for competence and caring, Hoffman's sacrifice and failures of self are redeemed by personal growth. He seems to have achieved that state of grace which one hopes every trainee—at least on reading this book—will be inspired to struggle toward. □

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From *Under the Ether Dome*

By Stephen A. Hoffman

Physicians are always at risk of taking themselves too seriously. It is, I would go so far as to say, one of the worst occupational hazards. I suppose I was fortunate in being relieved of this danger early on. In my first month of school I had an experience that saved me from taking either medicine or myself too seriously.

Suffering already from a lack of clinical relevance, I phoned my tutor during the third week of classes and asked if he could arrange for me to see an operation. "Meet Dr. Stone in the OR at six tomorrow morning," he said.

Dutifully I arrived at the appointed time, but there was no Dr. Stone in sight. Instead, I was met by an OR nurse, who motioned to a cart laden with green scrubs. "Excuse me, is there anything smaller than extra large?" I asked after rummaging revealed only oversized garments. "That's all we've got. Laundry isn't back yet" she told me.

I found the locker room and dressed. As I did so, I discovered that the sleeves on my short-sleeved shirt reached nearly to my wrists and that I had to tie the pants several times about my waist to keep them up. I even had to cuff the legs. The only cap that I could find was immense and bonnetlike, and when I had secured it in place, I looked something like a hooded falcon. Heading over to the sinks, I was passed by two surgeons, one of whom turned to the other and said, "Who the hell is that?"

Once I reached the sink, I realized that I didn't have the foggiest idea of how to scrub. I appealed for help to a nurse who was scrubbing at the sink to my right. She was very kind and took me through the procedure step by step. Midway through the soaping, a surgeon appeared at the sink to my left and began to scrub. When I had completed the ritual of soaping, the nurse indicated a panel beneath the sink that I should press to rinse off the suds. I pressed what I thought to be the panel she had indicated, but the jet of water, instead of coming directly toward me, shot out to my left and sprayed the surgical resident in the face. I was treated to a flood of angry words.

Determined to make no more mistakes, I looked on studiously as the nurse who had helped me scrub entered the operating room. She was met promptly by another nurse, who handed her a towel. I couldn't quite decipher the precise choreography of motions with which she dried her arms and hands, but I thought that I could pull off a rough facsimile when it came my turn. Next, she was handed a gown, which she appeared to almost toss into the air before she thrust her arms through the sleeves. Finally gloves were held out to her, and with a forceful push, she slipped her hands into them.

Having rehearsed the steps in my mind, I walked confidently into the operating room. But this time no one appeared to assist me. I thought that there must be some signal that the other nurse had provided and that I had missed. So I held up my hands. There was no response. I moved around, but the three or four people in the operating room continued to go about their business. I coughed. Still there was no response. Finally I said, "Hello, I just finished scrubbing." "Who cares?" the resident whom I had inadvertently sprayed replied.

At last a nurse appeared. She handed me a towel. By this time quite flustered, I made a total mess of drying my hands, and she could only stare in amazement. Next, she handed me the gown. I did exactly as I thought the other nurse had done, grasping the gown from the top, shaking it open, and tossing it lightly into the air to expose the openings for the sleeves. But when I tried to thrust my arms through, the sleeves weren't there. The gown had fallen to the floor.

"Sorry about that," I said, embarrassed. I looked up to see four pairs of eyes suddenly trained on

the floor. No one spoke a word. I finally managed to get a gown on, but when it came time for the gloves, I pushed so hard, determined to imitate the nurse who had preceded me and to make no more mistakes, that I sent my helper into the wall. She avoided colliding with the patient who was asleep on the table by only a narrow margin.

As if that weren't enough, I made the stupid mistake of mopping my brow, which was by now quite drenched, with one of my hands. Instantly, I realized what I had done. "Contaminated myself, didn't I?" I asked rhetorically and ruefully. The nurse, who was by now more stunned than exasperated, removed my no longer sterile glove and outfitted me with a new, bright orange one. I had also contaminated my sleeve, so she got me a new one from her armamentarium of spare parts.

Realizing that I was a menace to myself and others, I positioned myself in the corner of the room where I hoped to stay out of the way. I held on to the front of my gown with both hands, as the nurse had tactfully suggested. That way my hands would also be out of harm's reach. I stood there motionless, afraid to move, waiting for the arrival of Dr. Stone and the beginning of the surgery.

Soon Dr. Stone appeared. As he walked in, he cast a quick look over in my direction. "What happened to you?" he asked. "Contaminated myself," I said guiltily.

The operation, a thyroid lobectomy, began, and I took a position at the patient's feet, remote from the goings-on, where I hoped to avoid wrongdoing. A half hour passed, then an hour. The surgeon was intent on his work, and while he made an occasional anatomic observation for my benefit, he maintained his attention steadfastly on the operating field. I couldn't say that I minded being ignored.

Unfortunately, I realized, my pants were beginning to loosen. In fact, they were in imminent danger of slipping to the floor. I became utterly absorbed by the impending crisis, paying no attention to the case. How was I going to keep my pants from falling down? My clothing was sterile and I couldn't use my contaminated hands. I spied a stool a few feet away and unobtrusively, or so I thought, nudged it toward me with my foot. Then, matter-of-factly, I lifted one foot onto the stool, thereby helping to support my pants in place.

Several minutes later the physician threw a quick glance in my direction. He returned his gaze to the operating field without saying a word, and I thought that I was off the hook. But a few moments later he asked, "What are you doing?" Thinking quickly, I blurted out, "I'm resting my foot." There was a pregnant silence. "I see. You're resting your foot," he answered after a while. "What the hell do you mean you're resting your foot! It's only your third week in school and you're resting your foot?" "Well, I have this foot condition. . .," I replied, growing more and more nervous.

I became utterly absorbed by the impending crisis, paying no attention to the case.

Several minutes passed without further comment, and I thought that the crisis had safely passed. But then came the moment I had dreaded. "Dr. Hoffman, I want you to come up here and take a look." "Oh, I can see just fine from down here," I piped in as nonchalantly as I could. "What do you mean?" Dr. Stone bellowed. "You can't see a damn thing from down there." "Well," I said, panicking, "actually, I see better from down here. I'm farsighted"—at this he cocked a sidelong glance as if I had said something stupid—"I mean nearsighted, I mean, whatever, I just see better from farther away."

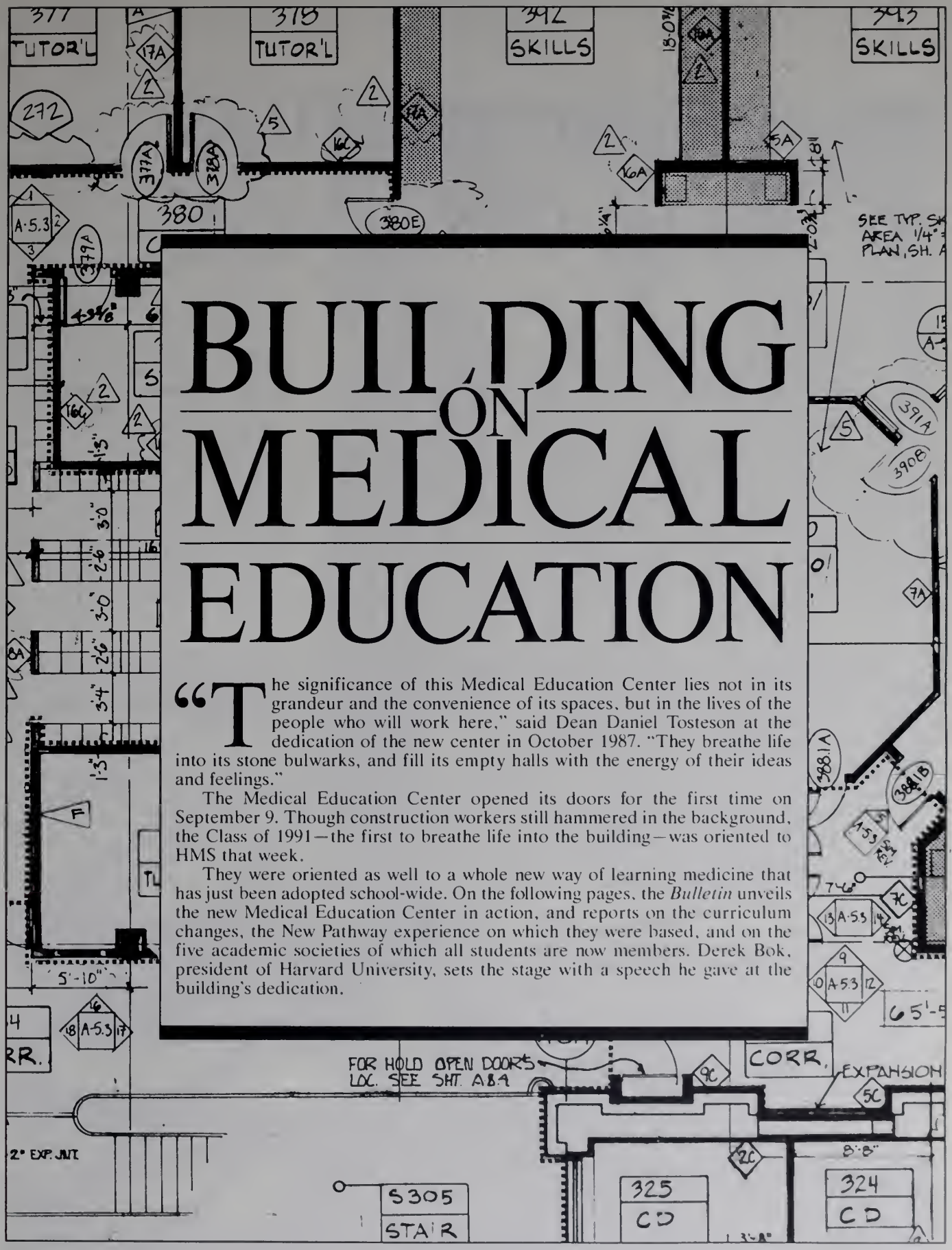
Dr. Stone was not convinced. "Get up here!" he commanded. "Are you sure?" I asked feebly. "Get up here!" he bellowed. I took my foot off the stool, ventured a step or two, and promptly my trousers slipped to the floor. No one said a word. No one even laughed. Dr. Stone glanced at the floor but for a while made no comment. I waited mortified, unsure of what would come next. I remember thinking that this was the worst moment of my life.

"Now what do you have to say for yourself?" Dr. Stone asked. "I'm sorry," I replied. "No, that's not the right thing to say," he responded quickly. Oh, no, I thought to myself, he must be really mad. Maybe they're going to boot me out of medical school. "That's not the right thing at all," the surgeon continued. "How do you think you're going to get them back up?" I paused, not knowing what to say. "How about asking for some help? How about asking the nurse to pull your pants up?"

My face, had it been exposed, would have been redder than the blood in an artery. "Nurse," I began again, a little louder, "would you please pull up my pants?" Obediently, the nurse who had assisted me pulled them up and gave the cord a few good ties. For the remainder of the operation I stood mute at the surgeon's side, humiliated and ashamed, thinking only about the moment when I could shed my green garb and dash back to my dorm.

The surgeon didn't speak another word to me during the rest of the case. When the incision had been closed and the last suture placed, I slipped out, grabbed my clothes from the locker room, and changed in a bathroom remote from the operating suite. Taking the basement route, I beat a hasty retreat to the dorm.

In the security of the dorm I could only laugh at myself. I had had my first taste of medicine and had been made to swallow a heavy dose of humility. What a way to begin my medical career! At least I had exposed my fallibilities early on and maybe lent some color to the surgeon's day. As long as they didn't throw me out of medical school, the morning hadn't been all bad. □



BUILDING ON MEDICAL EDUCATION

"The significance of this Medical Education Center lies not in its grandeur and the convenience of its spaces, but in the lives of the people who will work here," said Dean Daniel Tosteson at the dedication of the new center in October 1987. "They breathe life into its stone bulwarks, and fill its empty halls with the energy of their ideas and feelings."

The Medical Education Center opened its doors for the first time on September 9. Though construction workers still hammered in the background, the Class of 1991—the first to breathe life into the building—was oriented to HMS that week.

They were oriented as well to a whole new way of learning medicine that has just been adopted school-wide. On the following pages, the *Bulletin* unveils the new Medical Education Center in action, and reports on the curriculum changes, the New Pathway experience on which they were based, and on the five academic societies of which all students are now members. Derek Bok, president of Harvard University, sets the stage with a speech he gave at the building's dedication.

PRESCRIPTION FOR CHANGE

by Derek Bok

After years of looking at plans and discussing possibilities, it is a wonderful treat for me to welcome all of you here to the opening of this temple of learning, which we, with the understatement characteristic of this institution, refer to as the Harvard Regency. Those of you who have not toured the facility will understand the allusion when you walk through the great vaulted atrium filled with potted plants, chairs and tables, and medical students sipping coffee in the courtyard, chatting amiably in one of those long, tranquil moments between occasional bursts of learning.

It took over fifty thousand years for *Homo sapiens* to progress from living in dark caves to the comfortable accommodations in which so many people in this country now reside. It is a tribute to Dan Tosteson and his administration that the Medical School has accomplished a similar transition for its students in only three years.

As we dedicate the building, let me pause for a moment to consider the magnitude of what goes on within. Medical education is an unusual educational undertaking. It is much, much more difficult than legal education or management education, or preparation for public administration or public school teaching. I say this as someone who has taught in more than one of the other professional schools within the university. Even my exalted stature of president of Harvard University does not enable me to walk into a medical school classroom and



begin teaching. That would be far too dangerous for those numberless patients whom our students will encounter in the years to come.

What medical schools have to do—which makes their work so much more difficult than other professional schools—is to take untrained men and women and in a few years transform them, somehow, into professionals who have mastered a vast, staggering accumulation of facts, professionals who are familiar with complicated technology for which there is no parallel in other professional schools, who are prepared to perform the most harrowing acts: cutting into their fellow human beings, intervening in the most intricate parts of their anatomy, making life and death decisions under extraordinary pressures of time. Somehow this system does turn out physicians who are capable of performing these remarkable feats often in extremely tense and difficult circumstances.

Today, medical education is at a crucial point. Despite these accomplishments, there is no part of higher education that is more severely criticized for antiquated methods and for resistance to change. Criticisms go back decades, and sometimes over a hundred years, about the undue strain placed upon students, the excessive reliance on memorization, the boredom incurred through exposure to interminable lectures. But because of the difficulty and importance of the physician's task, and perhaps because of the competing pressures of patient care and research, faculties of medicine everywhere are reluctant to make fundamental changes in the traditional methods of education. After all, human lives are at stake and it is always possible that the changes we make in the curriculum may render students less able to do their critical work effectively.

What is interesting today is that the forces pressing for change have become all but irresistible. The avalanche of information now coming from the new biology clearly exceeds the capacities of human memory. The computer offers such irresistible methods of storing and retrieving and manipulating information that its capabilities cannot be ignored. There are decision-making techniques that rely upon mathematics and statistics, which offer sufficient promise to improve on human judgment that they must be somehow incorporated into older methods of decision-making.



Harvard President Derek Bok (left) and Harry Ellenzweig, architect of the Medical Education Center, at the dedication celebration

At the same time, society is pressing its own agenda on doctors who are already burdened with staggering technical and informational demands. People are aroused, as we know from reading the newspapers, about ethical issues that are often magnified by the introduction of new technology. We hear complaints that technology is separating doctors from their patients. We perceive more clearly the importance of effective communication in persuading patients to avoid life-threatening behavior and to follow regimens prescribed by their physicians.

On top of all these pressures, the public is also worried about rising costs, as well they might be now that the share of the GNP going to health service has risen to 12 percent and is bound to rise still further. New methods of delivering care designed to cope with those cost pressures are imposing restrictions upon the freedom and the initiative of doctors, and threatening to transform the medical profession, with its traditional inde-

PHOTOS BY ULRIKE WELSCH

pendence, into something much more circumscribed and regulated.

At a moment like this, with all these new demands being imposed on an already overstuffed medical education, the words of a great Harvard physician, Edward Churchill, come to mind: "Change is to be feared only if those responsible for the preservation of essential values fail in their tasks." It is the forbidding responsibility of Dan Tosteson and his faculty colleagues not to fail in preserving essential values even as circumstances lead them to prescribe momentous changes.

This structure, in my view, houses the most sweeping reform of basic medical education that is going on anywhere in the country today—a gigantic effort to change creatively and boldly while still preserving the essential values so important to medical education.

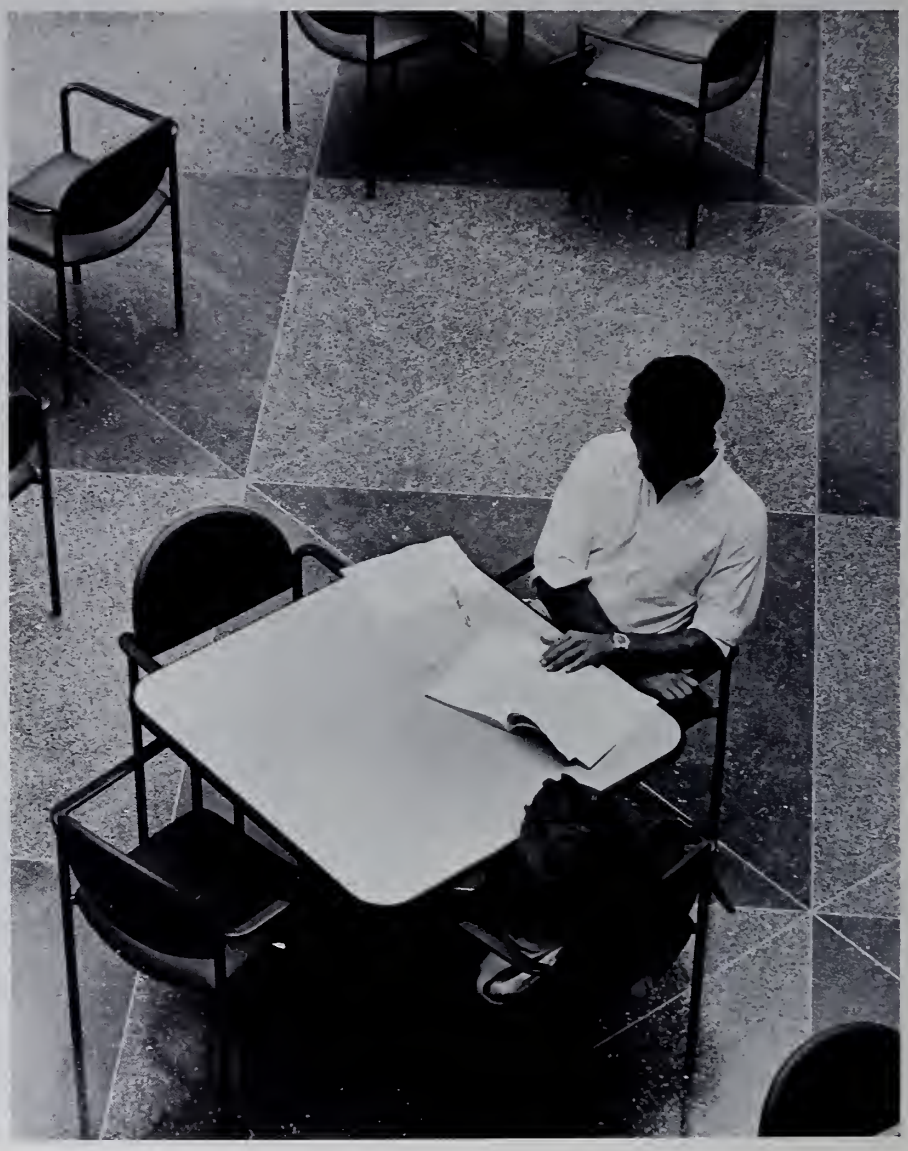
The facilities embody an internal plan that makes possible a major shift away from lectures to seminars, individual tutorials, and ways of teaching and learning that emphasize self-learning rather than memorization as the core of the educational process. The building welcomes the computer as a major tool to cope with the overload of information. The plans accommodate societies, each with their different flavor and theme, in which students carry on their learning. And that learning incorporates a broad view of medicine, which accomodates ethical, social, and economic aspects of medicine along with its essential scientific core.

It is common for large, established, comfortable, complacent institutions like Harvard to let others do the innovating and risk-taking. Then Harvard with its money and prestige can adopt the new ideas, often claiming credit, and move on to the next set of problems. That is the easy way, but it should not be Harvard's way. Throughout our history, our finest moments have always occurred when we have taken a difficult educational problem and found some bold, innovative solution, made it work, and set an example that others could profitably follow.

That is what we did in the Law School over a hundred years ago with the innovations of Christopher Columbus Langdell which transformed legal education into the shape that it still retains today. We did it 50 years ago in developing a new idea of business education. We have been doing it in the last 15 years in the Kennedy School by creating an entirely new concept for preparing young men and women to go into public service as government officials.

Today, we are in the process of trying to make a major change at a time of crisis in medical education. It has been said many times that changing a curriculum is much like moving a graveyard. If that is so, then certainly changing the curriculum, teaching methods, instructional technology, and constructing entirely new facilities must be closely akin to moving the entire Mt. Auburn Cemetery. It is an immense task.

In closing, I think it is fitting to point out that one person above all others deserves credit for developing this vision, for conceiving it in the largest possible terms, and for pursuing it relentlessly, single-mindedly, against great odds, to its final implementation. That person is Dean Daniel Tosteson. In saluting this building and all that goes within it, we salute his handiwork and its enduring importance to medical education at Harvard and throughout the country. Nothing could make me prouder of the Medical School. □



BUILDING ON MEDICAL EDUCATION

THE PATH NOW TAKEN

Decisions made last spring will have far-reaching impact on the way students henceforth learn medicine at Harvard Medical School. The school has taken another giant step down the "new pathway to general medical education."

For the past two years this new pathway has been pioneered by students and faculty in the Oliver Wendell Holmes Society (OWHS). Their experience has proved so successful that, at the urging of faculty members, the new approaches to learning have now been hybridized with the old. The result is the "common pathway" that all first-year medical and dental students will take this fall.

This year, all students will also be members of one of five academic societies. Each society will have a core group of faculty (tutors, senior fellows, and a society master) who will teach, advise, and interact with the student members throughout their four years.

The new medical education center is the most visible symbol of the changes taking place at HMS this year. The center contains a home base for each society—five separate clusters with rooms of varying sizes in which



PHOTOS BY ULRIKE WELSCH

Students in the atrium, the social center of the new building

society members can study, use computers, and meet formally and informally. This education center provides the framework in which the new methods of learning can work.

Dean Daniel Tosteson and the many others involved in the evolution of these changes hope that students will no longer be the passive recipients of didactic, large-group, fragmented lectures. They would like to see students learn more principles than facts, develop attitudes of commitment and healthy skepticism, learn communication and problem-solving skills, and expand the analytical knowledge base that all physicians share regardless of specialty.

James Adelstein, dean for academic programs, has long been involved in developing teaching resources and planning the medical education changes implemented this year. In the following interview with Ellen Barlow, managing editor of the Bulletin, *Adelstein discusses some of these changes at HMS in greater detail.*



James Adelstein, dean for academic programs

HMAB: *Just how different from what alumni knew will medical education be for the student entering this fall?*

JA: There will be differences in terms of the process of learning as well as in the substance. There will be fewer lectures and more emphasis on small-group, self-directed learning. Unlike the old, full days in the classroom, afternoons will be mostly free for study and reflection.

How different really depends on what years alumni were here. Those who graduated more than 30 years ago would find today's curriculum a much more intense introduction to the biological sciences. Back then, the disciplines were spread over one and one-half years; in the last two decades the same subjects have been concentrated into one year.

The subjects are not really much different, but there is more to be learned, and the material will reflect a greater understanding at the cellular and molecular level. And the material is not organized in the same way.

In the natural sciences there will be four major "blocks" in the first year: the Human Body block, which will bring together the two main morphologic sciences, histology and gross anatomy; the Metabolism and Function of Organ Systems block, presenting the essence of human physiology and biochemistry; a block on Genetics, Embryology, and Reproduction; and a fourth on Identity, Microbes and Defense, encompassing microbiology, pathology, and immunology.

For the past 15 years, each of these sciences has been taught as a separate subject. Medical students essentially took eight courses, including the basic neuro sciences, which now will be taught at the beginning of the second year.

Social sciences and the humanities will also be included. Unfortunately, for a long time these subjects were the extras—such as French, music, and washing were in *Alice in Wonderland*. We now hope to see them more firmly embedded in the curriculum.

Another thing that will be different is the association between faculty and students. Many alumni may remember the days over 25 years ago when teaching took place in depart-

mental classrooms. Now, classes will be held in the new medical education building, and groups of faculty and students will also meet together in "societies." The hope is that this will foster closer relationships between students and faculty.

Since this approach to teaching was conceived as part of the New Pathway, do the school-wide curricular changes represent its success?

I think the new approach borrows heavily from the experience of the Oliver Wendell Holmes Society over the past two years. (Dean Tosteson has always referred to the New Pathway as the total constellation of innovations in medical education, which includes the Oliver Wendell Holmes Society.) It's a dynamic, evolving process. With the exception of the Human Body which has been an OWHS course, these new blocks aren't identical to any existing courses. And even the Human Body block has continued to evolve over the past two years.

Why start the new curriculum this fall?

There were several pressures to move on to common courses for all medical students. Some students and faculty were unhappy about a two-tiered system. Members of the departments of anatomy and cellular biology and of neurobiology were quite eager to integrate the old and new methods of teaching their subjects. Also, many senior members of the anatomy department felt that the OWHS format was successful and they wanted to extend it. To accomplish these ends, it was decided to adopt a universal schedule.

We then explored the idea of all students taking *all* the same preclinical courses, particularly the idea of hybridizing the best of the new curriculum with the best of the old. People seemed enthusiastic. It's really much more efficient to teach one set of subjects.

There are now a series of committees planning curricular changes for students in the second year. Again, the idea is to coordinate the existing curricula.

How have the faculty reacted?

They have taken an active part in the evolution of ideas all along. Starting about 1979, there were a series of educational workshops and symposia in which the faculty identified future issues in general medical education—such things as active learning, the development of humanistic values, a sense of community, and better integration of clinical and preclinical subjects. From those workshops arose the planning groups for what eventually became the OWHS. The planning groups always included both students and faculty.



PHOTOS BY ULRIKE WELSCH

Everyone knows about the Boylston Society, the oldest student medical society in the U.S., formed in 1811. Alumni who studied here after 1978 would be familiar with the student societies that were started then. How will these new societies be different?

The Boylston Society is a society for students interested in research and scholarly activities who get together to read papers on their experiences in medicine. It will remain so.

Dan Tosteson brought to Harvard a conviction that this very large faculty somehow needed an instrument by which it could meet with its students on a more personal scale. He believes the new societies can play a role somewhat akin to that of colleges at Oxford and Cambridge. At those universities, the individual departments determine content for the lectures and laboratory instruction, but the colleges provide the tutorials. Dan wasn't planning to replicate this model, but it did influence his view.

The societies formed in 1979 were socially-oriented discussion groups that focused on medical issues. They had no direct or formal role in a student's general medical education. This version of student societies will no longer exist, although of course other extracurricular student organizations and activities will continue. The old societies are being replaced this fall by the four new academic societies that are joining the Oliver Wendell Holmes Society.

Each new society consists of faculty and student members who will meet together over the full four-year course of study. Among other things, faculty members are there to help students plan a coherent program.

How were the masters of the societies chosen?

A committee of senior faculty made recommendations on who might serve, and Dean Tosteson made selections from those recommendations. It was

also decided that the societies be named for eminent scholars from the faculty. The masters were given guidelines and they themselves chose the names. Ronald Arky is master of the Peabody Society, Stephen Krane of the Cannon Society, and Stephen Robinson, the Castle Society. Daniel Goodenough will continue as master of the Holmes Society and Richard Kitz of HST.

The medical education center was designed with space for five student clusters. Were the ideas for the new teaching facility, curriculum, and division of students into societies part of a single, preconceived vision?

I wish it had been so systematic. They started out as separate ventures. There was an obvious need to improve our educational facilities. Even before Dan

Societies and the Clerkship Years

HMS alumni played a very real role in shaping the goals of the new academic societies. "When Dan Tosteson and I run into alumni around the country, they always tell us about individual faculty members they had known and remember fondly," says Daniel Federman, dean for students and alumni.

But through the years the faculty has become larger and more dispersed, and opportunities for person-to-person interactions for students with faculty have diminished. "The societies were designed to restore sub-units of the school so there could be more of these interactions again," says Federman.

On the surface all non-HST societies are similar. No society will specialize in a particular discipline of medicine and curriculum will be pretty much the same for all. However, there will probably be some "microdifferentiation," the distinctive flavor individuals contribute to their own society.

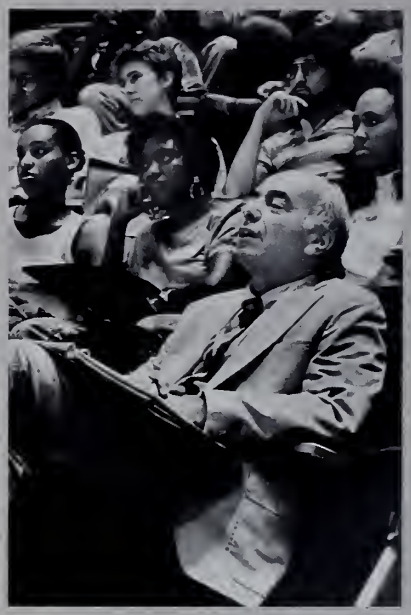
This year, elective courses will account for about 30 percent of a student's schedule. Federman points out that this may be a lower percentage than some alumni remember. "The number of required courses has increased through the years because of state licensing requirements." Now, for example, clerkships are required in obstetrics/gynecology, pediatrics, and psychiatry.

Second-year students have been divided into the four non-HST societies as well. (HST—the HMS/MIT Health Sciences and Technology program—will still entail a separate application process.) Current third-and fourth-year students will be invited to join the societies, and the masters are now trying to develop a program for their inclusion.

The Oliver Wendell Holmes Society was the prototype of the new societies, and the first group of 23 OWHS students started their clerkships this summer. Their experience should pave the way for developing how the society model can work through the two years of clinical rotations. Although it is too early to quantitatively evaluate the OWHS clerkships, Federman reports that he and the others who designed the program are "pleased and excited."

The new model of clerkships has been developed to encourage clinical faculty to focus more on the medical student; during teaching opportunities such as rounds, house staff have traditionally played a major role. In the new clerkships, each student is assigned a faculty preceptor who monitors the student's progress. This relationship is designed to supplement, not displace, the student's experience as part of the clinical team. In addition, a rotation through an ambulatory care center has been added.

The new clerkship experience is not dramatically different. Federman points out. "In broad terms, the clerkships represent only about a 15 to 20 percent difference from the classical pathway, whereas curriculum changes the first two years represent about a 70 to 75 percent difference."



Daniel Federman at orientation

The process of change in the curriculum and organization of teaching at the school this year has been described as dynamic. "That's an understatement" says Federman. "Things are evolving literally daily as issues arise." □

—EB

Tosteson became dean, a committee had met about this problem. I reconstituted the committee in 1979.

We thought first about the general things we needed to do. But as we moved along to final designs, we borrowed heavily from ideas the New Pathway was generating in the OWHS. For example, there are many small conference rooms, which evolved from the needs of OWHS tutorial groups.

The original designs always planned to make the building a center not only for classrooms, laboratories, and dissecting rooms, but also for quiet study and, in the atrium, for noisier discourse and socializing. The quiet areas—which eventually became identified with the societies—were planned with study desks, computer terminals, and rooms for small groups to get together in acoustic isolation.

So the ideas converged. But the seeds of them were from independent efforts.

Is there any progress on the age-old question of how much teaching is expected of medical faculty?

A committee chaired by Ramzi Cotran is still deliberating on this. They've come to the point of saying that everyone with a faculty appointment has a responsibility to teach medical students. But the details have yet to be determined.

There is no question that they think there ought to be a policy and that the policy ought to be fair in distributing the loads. This issue will be further resolved during this year, so each faculty member will know more precisely what obligations he or she has.

Students have been heard referring to the medical education center as "mecca." Despite humorous intentions, might there be validity to this moniker?

I expect it will be a magnet, but not just for the male faithful. It is a center not only for medical students, but also for graduate students in the Division of Medical Sciences.

One thing I'm hoping is that in spite of the fact that medical students and graduate students in the division are taking separate courses these days, the building will help them get together. They should also be encouraged to take elective subjects together. In the long run, perhaps some of the more advanced graduate students will participate in the education of medical students.

After devoting so much time and energy to the plans, how do feel when you walk into the new teaching facility?

Terrific! □



PHOTOS BY ULRIKE WELSCH

THE MASTERS MINDING THE SOCIETIES

There will still be the class-wide activities—the second- and fourth-year shows, the "attitude readjustment" parties, the social clubs, and yearbook. But starting with this year's entering class, all HMS students will be affiliated primarily with one of five academic societies throughout their four years.

The societies were conceived as discrete communities of learning within the larger medical school community. Students attend small-group tutorials with just their society classmates. They learn from faculty tutors who are members of their society. Their advisors are members, as are the "senior fellows"—faculty consultants representing each of the approximately 17 disciplines that students are required to assimilate. The soci-



Busts of HMS luminaries line the third-floor balcony overlooking the atrium. From left: Edward Hammond Clarke, Charles Montraville Green, James Jackson, Henry Ingersoll Bowditch, Benjamin Waterhouse, and John Collins Warren.

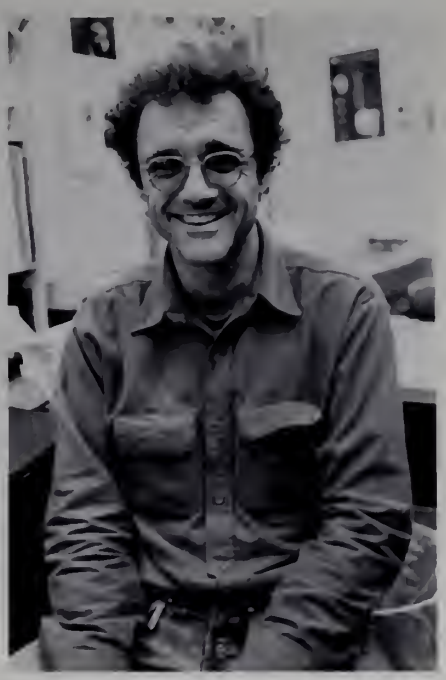
PHOTO BY ULRIKE WELSCH

ety is also a home base, a physical location in the new Medical Education Center, where students return to study and discuss their studies, among themselves and faculty.

Daniel Goodenough, Ronald Arky, Stephen Krane, Stephen Robinson, and Richard Kitz are the masters of these societies, which—with the exception of the HST Society—each bear the name of an eminent figure in the history of the medical school. These masters are all senior professors with a genuine interest in general medical education, who will try to promote a sense of community among the faculty and student members of their societies.

The masters will maintain a longitudinal vision of education at HMS and will play a pivotal role in the feedback loops governing curriculum planning and student evaluation. The five masters, and Deans Tosteson, Federman, and Adelstein meet collectively as the Council of Academic Societies to oversee the development of the societies. The council is chaired by Thomas Smith '65, who led the task force that recommended the formation of societies last spring, and who is also past chairman of the curriculum committee. The council provides feedback on the curriculum to the curriculum committee, which is charged with the actual planning.

Following are five brief profiles of the men at the helm of the societies and the alumni for whom the societies were named.



Daniel Goodenough

Daniel A. Goodenough



As professor of anatomy, director of the Human Body block, and master of the Oliver Wendell Holmes Society since its inception in 1985, Dan Goodenough has worn a number of hats since coming to HMS in 1971. He has taught in both the traditional curriculum and the small-group, tutorial-based New Pathway.

Goodenough defines the role of a master in two ways. He keeps student records and he acts as a potential link between the students and other people in the HMS community with similar interests. Because he stays with the OWHS students for the full four years, he may become a confidant of theirs as well. Among HMS students, Goodenough is already known for his caring concern. "Because I'm in charge of the Human Body block with Elio Raviola and also master of the OWHS, I get to know all the students right away, and they know me. They have an opportunity to perceive me as someone safe, someone they can talk to."

When asked about his personal educational philosophy, Goodenough waxed eloquent: "I think the curriculum had to be changed from a competitive to a cooperative style. Can you teach hard science in the context of affiliation? Can you think about thermodynamics and affect at the same time? We want to give the students some sense and appreciation for the awesomeness of the tasks they will be called upon to do."

Goodenough feels sure that the changes are good ones, but "the verdict isn't in yet. I think the whole program is at a turning point—it could sink or swim."

He points out that some very hard problems remain to be solved. In an institution where research has been the outstanding factor in promotions, Goodenough asks how faculty will be rewarded for the additional time they now have to put into the new teaching paradigm.

"Another problem is that not all the faculty are convinced yet that this new teaching style will work. But to be convinced, they need to do it. It requires a leap of faith. I felt terrified when I started teaching this way. You have to take off your hat as an expert and become a facilitator instead. Everyone who has taught in this way is delighted. It's fun; it's a real high."

Oliver Wendell Holmes, the society's namesake, graduated from HMS in 1836. He served as dean of HMS from 1847 to 1853, but is also well remembered as a professor of anatomy, a poet, essayist, novelist, and one of the best-loved 19th-century American literary figures. It is fitting, Goodenough points out, that this unique and creative figure should grace the pioneering society with his name. □

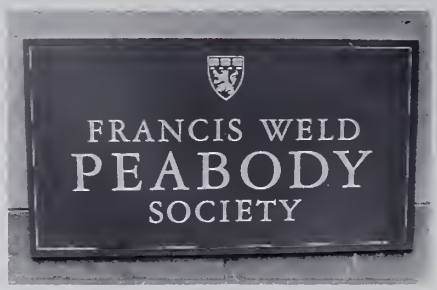
—Debra J. Trione

PHOTOS OF MASTERS BY SHARON BRAY



Ronald Arky

Ronald A. Arky



To Ronald Arky (and indeed many others), Francis Weld Peabody '07 epitomizes the humane caring for a patient that medical education should impart. Peabody was one of the medical school's outstanding teachers who, as Arky says, "delighted in spending time with students."

Close faculty/student interaction is a major goal of the societies. Arky has taught medicine at Harvard for the past 25 years, and says he has become increasingly aware that small-group, problem-based teaching is the way to go. He has always been interested in the educational process, and felt honored when asked to be a master. "At this time in my life I am looking for some different challenges."

During the past 17 years Arky has been chief of medicine at Mt. Auburn Hospital, and since 1980, the HMS Charles Davidson Professor of Medicine. Before that, he was chief of metabolism and diabetes in the HMS Thorndike Laboratory at Boston City Hospital. Peabody had been director of that same laboratory from 1922 to 1927.

Though the two men never crossed paths—Peabody died three years before Arky was born—Arky says he has harbored a fondness for Peabody. When the Class of 1986 asked Arky to speak at commencement, the theme he used was Peabody's 1926 classic treatise, *The Care of a Patient*. He reiterated advice Peabody had given Harvard students 60 years ago: "The treatment of a disease must be completely *impersonal*; the treatment of a patient must be completely *personal*."

When the masters were asked to choose names for their societies, Arky—who had headed the original incarnation of the Peabody society—again turned to Peabody's name for inspiration.

"Any educational system that brings students closer to faculty and working together is bound to have some positive results," says Arky. When he started medical school at Cornell in 1951, class size was roughly one-third that at HMS today. He had greater access to faculty as a result, and feels that the societies can compensate for the larger classes that have led to a more impersonal medical school experience.

"We're still feeling our way with the societies, but it's exciting," Arky reports. He spends most of his time in the clinical world, and says he enjoys being back with students in their first year. "It is truly gratifying to watch students, most of whom are right out of college, being exposed to the ways doctors doctor for the first time." □

—Ellen Barlow

Stephen H. Robinson



"I may have mentioned Bill Castle's name first," says Stephen Robinson '58, master of the society named in Castle's honor. "But if I hadn't, others clearly would have suggested that a society be named after him."



Stephen Krane

William B. Castle '21, the Francis W. Peabody Faculty Professor of Medicine, is the only living person to receive this distinction. As Robinson describes him: "He stands out as a much revered humanist/intellectual who had an enduring influence on everyone associated with him." Castle, now age 90, was a pioneer in blood disease research. He identified the lack of intrinsic factor as the cause of pernicious anemia, and contributed to the understanding of other anemias. He was chief of the Harvard Medical Service and Thorndike Laboratory at Boston City Hospital; Robinson did his residency and several months of research in Castle's department.

Robinson says he is enthusiastic about the societies, partly because when he attended medical school, contact with faculty was sporadic. "Most of the faculty whom I got to know well were those I encountered on clinical rotations—late in the game." He hopes that with the societies—in which faculty and students are members of the same academic/social group—contact will be more regular and long-lasting.

"The concept of societies is a good one," Robinson says. "It should be a way of keeping lines of communication open with the students." He reports that at these early stages, some of the students are still becoming accustomed to the new curriculum, but most are generally enjoying it.

Robinson, like Castle, is a hematologist. Robinson's research has centered on factors that regulate the growth and differentiation of red and white blood cells. Defections in these processes cause such diseases as leukemia. At HMS he holds the George Reisman Professorship of Medicine, and he is also both clinical director of medicine and chief of hematology at Beth Israel Hospital.

"I have always liked teaching and would like to think of myself as an educator," says Robinson. One of the challenges he sees for himself and the other faculty members of the Castle Society is to develop useful relationships with students, to advise them, and to serve as mentors. "If I can play a role in seeing that the process of education is easier and more pleasant for students, then it will be fulfilling for all of us." □

—EB

Stephen M. Krane



"We can't teach everything in medicine," says Stephen Krane. "Our guiding principle now is to teach students how to learn. They still have to develop a basic vocabulary, but there's a new emphasis on problem-solving skills."

Krane is chief of the Arthritis Unit at MGH, where he has been a skeletal and connective tissue specialist since 1951. This year, he was named the first incumbent of the Persis, Cyrus, and Marlow B. Harrison Professorship in Medicine. He had been a master of one of the earlier, student-faculty societies, which had met once a month for dinner and presentations



Stephen Robinson

on how to develop careers in experimental medicine.

As master of the Cannon Society, Krane looks forward to guiding students through the veritable jungle of decisions they will make in the coming years about their own futures. "The system by which students have found a field and a mentor in the past has been haphazard—they may hear a good lecture, or go to a certain organizational meeting." He wants to help the students in his society decide which facet of medicine to pursue, and assist them in finding faculty with similar interests who can help.

Krane is excited about the tutorial approach, but he admits that some of the first-year students have been apprehensive about how they're going to do. "Once you convince them they're not going to flunk out of the first two years though, they relax. We don't pay attention to the scores on the national boards, just to whether they pass. The results on that test don't coincide with performance as a physician. No one's found a good way of testing who's going to be a creative doctor.

"As you watch students go through medicine, the growth, the transitions are extraordinary. The maturation process is like nothing else. These students have a wonderful opportunity: a nice building, a lot of people interested in them. They should feel that they are loved. Many people put considerable effort into this."

Walter B. Cannon's name is legendary at HMS. Cannon graduated with the Class of '00, and was so accomplished a student that he joined the HMS faculty immediately upon graduation. Six years later, he was chairman of the department of physiology—a position he held for 36 years. Cannon is perhaps best remembered for having originated the basic physiologic concepts of 'homeostasis' and 'the fight or flight response'. A recent book on the early life of W.B. Cannon was reviewed in the Summer issue of the *Bulletin*. □

—DJT

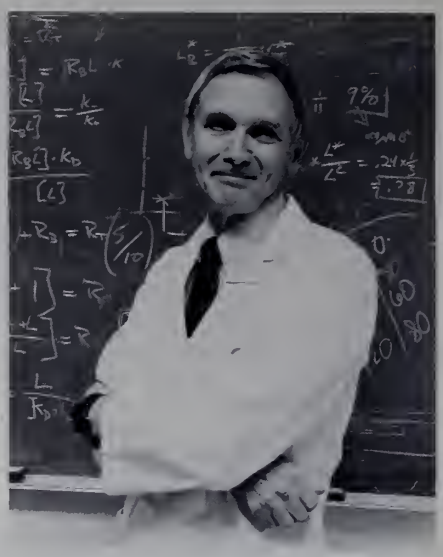
Richard J. Kitz



Richard J. Kitz, master of the HST Society, is co-director of the Health Science and Technology program with Roger Mark, the MIT head. Started in 1971 with Irving London as director, the HST program was already alive and well when the new society structure was implemented this fall at HMS.

Kitz confides that the faculty and students of HST were apprehensive about the new societies at first, but this new structure at HMS hasn't changed HST much. Because HST is a collaborative HMS/MIT program, it has had to stay on a semester system compatible with courses at MIT, and it remains more quantitative in approach than the rest of HMS. "While most medical students learn that the respiratory system inhales oxygen and exhales CO_2," Kitz explains, "HST students start with the fundamental equations governing the reactions."

Some of the new pedagogic techniques adopted this year by all the societies (small-group sessions, for instance) had already been a part of HST. But changes at HMS have shifted the HST program even further in the direction of tutorial sessions, case-based learning, and fewer large lectures. "The teaching methods we've adopted from OWHS should be very effective," affirms Kitz.



Richard Kitz

The HST master became animated with enthusiasm when he began to talk about the skills he thought a general medical education should impart. "The single most important quality is integrity and a sincere interest in helping people," he said. "You must come across as an honest person interested in the problems of others. This is a quality that can't be hidden." An inquisitive mind is equally important, he said. Students shouldn't be satisfied with merely locating a problem, but should be motivated to find the solution. And they also have to have a "quality of doubt—they have to wonder whether what they hear is right. A skillful tutor or preceptor can bring these things out."

It remains to be seen whether the HST Society will choose a new name in honor of an HMS/MIT luminary. Kitz is in the process of consulting with HST constituents at both HMS and MIT, and expects a determination soon.

Richard Kitz occupies the oldest named chair in anaesthesiology, the Henry Isaiah Dorr Professor of Research and Teaching in Anaesthetics and Anaesthesia, first endowed in 1917 at the MGH. He is also chairman of anaesthesiology at MGH. □

—DJT

COMMITMENT TO COMPUTERS

by G. Octo Barnett

"Life is short, and the art long, the occasion instant, experiment perilous, decision difficult." These familiar words from Hippocrates are carved on the stone wall of Building D in the quadrangle. We might well want to revise this statement today to include the phrase: "books innumerable, journals countless, lectures endless."

In the last two decades we have witnessed what has correctly been labeled the "information explosion" in medical knowledge. Many leaders in medical education and most students feel overwhelmed with information overload and with the static, passive nature of medical school.

It is a formidable task to keep abreast of both the knowledge in the basic medical sciences and the new methods for diagnosing and treating illness. Over 600,000 articles are published in the biomedical literature each year. If the most conscientious physician were to attempt to keep up

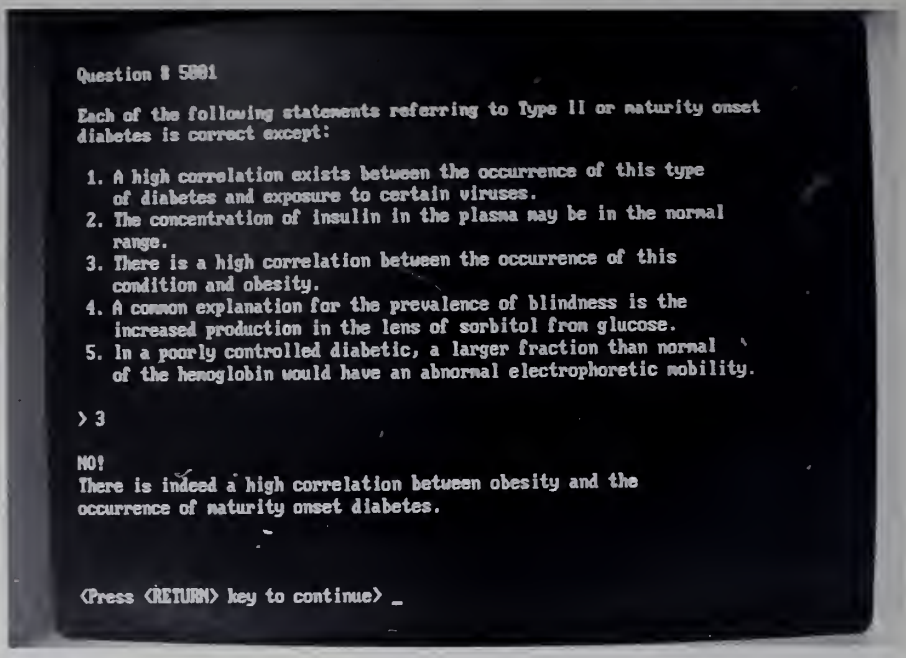


Octo Barnett (left) with Arti Rai, Steve Epstein, David Derck and other teaching assistants recruited to help their classmates with computer skills

with the literature by reading two articles per day, in 1 year even this compulsive individual would be over 800 years behind.

Despite major advances in the science and technology of health care, the training of physicians is little different today from what it was a half-century ago. The structure of medical education still consists primarily of lectures in which a procession of teachers relate large quantities of scientific material to a passive student audience.

The amount of material has far outstripped the ability of students to absorb it, and has placed impossible time demands on the curriculum. It is not practical to increase the duration of professional education; it is not wise to increase the fragmentation that results from narrow specialization; and it is not possible to depend on continuing education to fill the gap.



Harvard Medical School has restructured the curriculum, a process that began three years ago with the formation of the Oliver Wendell Holmes Society (OWHS). The intensive use of information technology is one of the key elements of this curriculum reform. In the OWHS, each student and faculty member was provided a computer for personal use, and everyone shared information through a telephone communication network.

As part of the school-wide curricular changes initiated in September 1987, access to information technology was made available to the entire student body. Individual students are no longer provided no-cost personal computers. Instead, a large number of computers are provided for general use in the Medical Education Center, Countway Library, Vanderbilt Hall, and in the hospitals.

In the revised curriculum, information technology is emphasized to facilitate acquisition of essential knowledge and the mastery of problem-solving skills. Comprehensive training and experience with modern methods of information management during the students' formative years may greatly enhance their effectiveness as health care practitioners throughout their lives. Information technology has the potential to aid students in mastering the ever-changing and ever-broadening mass of knowledge concerning the etiology, prevention, and treatment of disease.

Medicine is inherently a problem-solving activity, in which the efficiency and effectiveness of the process is strongly dependent on our ability to access and manipulate a vast knowledge base. The role of information technology concerns content, but even more important, concerns the method of education. Students should be given fewer answers and more tools—tools for self-teaching and for synthesizing, framing, and revising knowledge.

Computers provide the opportunity to practice the skills of seeking



First-year students Steve Epstein and Janet Kirby discuss a new computer program.

PHOTOS OF COMPUTER GROUP BY SHARON BRAY

information, testing hypotheses, and solving problems. The objective in using information technology is not just to teach facts but, more important, is also to create an environment where the student takes increasing responsibility as an independent learner.

In 1984, HMS received a generous five-year, multi-million-dollar grant from the Hewlett-Packard Corporation for equipment and personnel to develop computer-based applications to medical education. The computer technology currently consists of several components: a large central computer (HP3000), used primarily to support electronic mail communication, and over 240 HP personal computers (primarily HP VECTRAs), which are IBM-compatible, each equipped with a modem for network communication.

All communication between the HP3000 and the personal computers is done over standard voice-grade telephone lines. The decision to use telephone communications was based on the geographical distribution of the HMS "user" community. A number of students live in Vanderbilt, but the majority live in apartments scattered throughout the surrounding communities. Faculty members have offices located in almost a dozen different medical institutions around metropolitan Boston, and some prefer to have their computers in their homes rather than offices.

One of the goals of the information technology effort at HMS is to provide computing power in a coherent format that is easy to understand and use. We need a system that will not intimidate those unfamiliar with technology, yet will still be convenient for those who already have some experience with computers.

We provide commercially-available software packages (such as word processing and communications) as well as a number of applications written especially for HMS students. Development of these applications is a major task involving computer programmers on the information technology staff, as well as several post-doctoral fellows who are part of a training program in Medical Informatics at MGH and HMS.

We also provide formal training sessions for faculty and students, and a telephone "hot-line" for specific questions about the technology. This year, we have recruited a dozen students as teaching assistants to provide one-to-one support and training for their classmates.

One of the seemingly more trivial applications of information technology—electronic mail—has turned out to be one of the more important. Electronic mail allows an individual to use a network of computers to exchange messages with other users over standard telephone lines. Electronic mail was not viewed initially as having a major educational value, and we did not anticipate the positive impact of its ready availability on the educational experience of both faculty and students.

Electronic mail is similar to regular mail in that messages can be directed to a specific individual. Messages by electronic mail, however, can be directed simultaneously to a number of users, or can be posted on an electronic "bulletin board" for any reader. Another major difference between electronic mail and regular mail is the speed of transmission. As soon as the message is created and sent over the network to the central system, the electronic "letter" can be read by the recipient. This provides a potential for interaction and rapid response markedly better than normal mail service, which may take from two to five days to go from the quadrangle to one of the HMS hospitals.

Electronic mail also eliminates the "telephone tag" that often results when two busy faculty try to communicate by telephone—leaving a message, not being in when the return call is made, leaving another message, and on and on. Long messages may be composed and edited on a personal computer prior to transmission. Faculty and students can use electronic mail to collaborate on a variety of activities such as discussing an assignment, planning a conference, announcing a meeting, or writing a paper.

The OWHS faculty and staff have made extensive use of the system for planning and developing the curriculum materials and cases, and for communicating with other faculty and students about specific course questions. Because of the geographical dispersion of the HMS faculty, curriculum planning and development in the past was typically associated with many hours wasted in commuting to committee meetings and in trying to communicate by phone. Electronic mail has increased the efficiency of curriculum development, and has



influenced how the teaching sessions are planned and implemented.

The students use the system for sharing ideas about the curriculum assignments, personal interactions, and questioning the faculty. In a community where faculty and students may not have daily face-to-face contact, students feel that the intellectual networking made possible by electronic mail improves the educational experience and makes it more enjoyable.

Faculty reaction to electronic mail has ranged from enthusiastic use to complete avoidance, based in large part, it seems, on whether they had their own computer or not. Those faculty with personal computers at home or at work tend to be the most enthusiastic users.

It is not clear yet whether there will be a change in the student response to electronic mail now that most of the students will not be able to access the system from their homes. The general attitude of the students in the OWHS pilot project is that easy access from their home is critically important in the use of electronic mail.

Although electronic mail has become an important component of the information technology, the major goal of computer-assisted learning is to provide an environment where information can be presented in a problem-solving context—the student controls the presentation and has the opportunity to explore implications. The amount of rote learning required is the characteristic of medical education that many students find most distasteful. If not sufficiently stimulating, passive lectures and reading may not result in effective long-term recall.

Information technology makes it possible to present the material in an interactive mode using graphics and related visual images. Given that a certain amount of repetition is necessary to learn factual data, the computer is a way to make this repetition more enjoyable and retention more effective.

An example of a "drill-and-practice" computer-based educational program is a data bank of multiple-choice questions, similar to those found on National Board of Medical Examination tests. One set of this data bank



of questions is part of the biochemistry course, and is used by the students to study and review the important aspects. Other programs have been written to use a computer-controlled video-disk to teach the morphology of blood cell maturation. Programs with graphic representations of Davenport and Goldberg diagrams are used to teach the classification of acid-based abnormalities.

There are several advantages to computer-based exercises. The computer can act as a responsive tutor carrying on an interactive dialogue with the student. In this interaction the student has to think and respond, and cannot passively read or listen to a set of facts. The student maintains control over the interaction, using the program whenever and for as long as desired, exploring subjects in sequence of interest.

The computer will not substitute for the presence of an inspiring teacher. The computer program may, however, supplement some of the less personally rewarding responsibilities of a teacher, such as the presentation, review, and testing of basic facts and concepts.

To become a good physician, the student must also learn to apply the factual content of medicine to each specific patient case. A major challenge of medical education is to assist the student in learning the techniques of clinical problem-solving, which often involve complex and sequential decision-making. Students must acquire the critical cognitive skills involved in deciding what information to collect, in determining when there is sufficient data to justify making a diagnosis, and in choosing a therapy.

Despite the importance of clinical judgment in medical practice, clinical training has consisted primarily of a series of graded apprenticeships in which there is little systematic attempt to teach explicit models of the intellectual processes involved in clinical decision-making. The apprenticeships have been conducted in an environment in which, hopefully, there is an appropriate mix of medical challenges and educational supervision. For the most part, the student has been expected to acquire clinical judgment by learning to imitate the patterns of his/her instructors.

This time-honored way of teaching has several potential weaknesses: 1) each student's educational experience is relatively unstructured and may be incomplete; 2) skilled teachers with adequate time for close student supervision may not be available; and 3) an optimal mix of patient cases must be available for each student to learn about various disease entities.

One of the more exciting applications of information technology in

medical education is the use of computer-based clinical simulations to help the student acquire medical knowledge, clinical judgment, and decision-making skills. A computer-based patient simulation differs significantly from a "drill and practice" program. The roles of the student and the computer are entirely different. The scenario is constructed as a play, a simulation of a typical patient case, where the student acts the role of the doctor and the computer plays the patient.

The student controls the dialogue—asks questions to identify the signs and symptoms and laboratory test results, develops and tests hypotheses, and makes management decisions. The computer simulation is constructed so that the "patient" responds to the student's questions and therapeutic decisions in a manner that would be reasonable for the underlying disease process.

There are obvious limitations to the use of computer-based simulations. Because it is necessary to reduce the variability of real life to fit the computer model, the computer "patient case" is more simplified than it would be in real life. Also, the computer program is unable to provide an experience which elicits the patience and compassion which a doctor must exhibit in responding to a patient's questions and anxieties.

Despite these limitations, there are major advantages in supplementing clinical training with computer-based simulations, with which the student can practice and make mistakes without danger or inconvenience to real patients. Many students learn best through trial and error—the "what-if" approach. Patient simulations allow the student to learn the effects of particular interventions by "experience" rather than by simply reading or being told about the particular tactic. Computer-based simulations also remove the time and place limitations of patients with different diseases, allowing a much greater number and variety of patient cases to be seen and "managed" by the student.

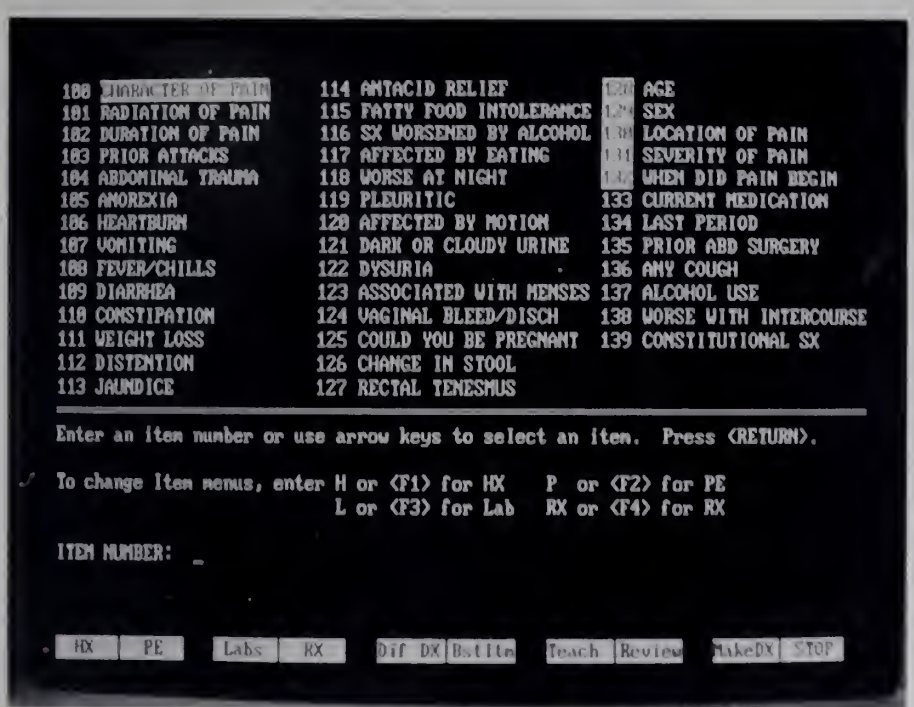
Among the clinical simulations being introduced into the clinical curriculum are applications dealing with abdominal pain, coma, and chest pain. These simulations are available on computers located in the Medical Education Center and in hospitals where the students have clinical rotations, and are also provided to students who have personal computers at home. It is too early to evaluate the impact of these patient simulations; however we know that students find them interesting and educationally valuable.

Documentation of past experiences strongly influences the practice of medicine, as it does physics or law. Our knowledge of the field is based on the findings and observations which are recorded in books and journals. It would be futile, however, to attempt to learn every possible fact which might be appropriate to the treatment of every case. Even if it were possible to master all relevant knowledge for just one field, the history of medicine has demonstrated that many of those facts will be outdated or proven wrong within a few years. The skills necessary to assimilate, understand, and use knowledge are more important now than the specific facts considered important at one point in time.

Any curriculum which aims to promote lifelong learning must include instruction on how to access and use published materials. But each month, more than 3,000 journals containing more than 17,000 articles are indexed by the National Library of Medicine. Limitations of time and accessibility to the material often make it difficult for the student to locate and read key articles or textbooks.

The National Library of Medicine has developed a computer-based databank, which is available directly by a dial-up service as well as through commercial vendors (such as BRS Colleague and PaperChase). Each month a major part of the world's published literature is indexed by NLM and made available via these networks. One of our most popular computer applications is a program that provides access to this index. The student enters a few key words into the computer to describe the problem of interest, and the system provides a list of articles that address this topic.

The first group of OWHS students given personal computers evaluated the various computer applications made available to them. Twenty-one of the 22 students who completed the questionnaire rated the computer-supported bibliographic access as being either of "great value" or of "extraordinary value." Within the next decade, more and more of the medical literature (including the full



text of both journals and medical textbooks) will become available as computer-stored data banks. Every student, medical scientist, and practicing physician should become proficient in the skill of using information technology to access the computer-stored data bank of medical literature.

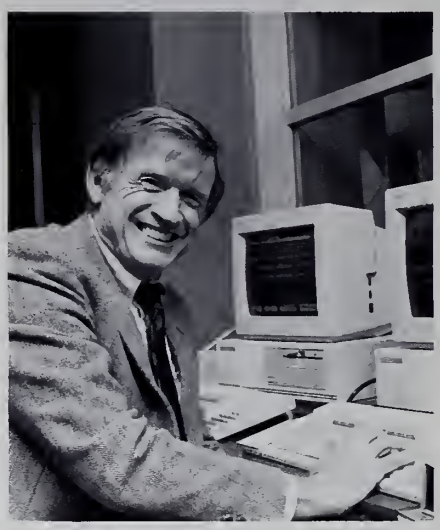
There are a number of important issues that must be considered before any final evaluation of the technology innovation can be made. Cost is one obvious issue. This information technology program (including hardware, software, and support) must compete with other programs for a fixed supply of money. To date, the Hewlett-Packard grant has covered all computer hardware, and personnel costs are supported both by the HP grant and monies from several different foundations and research grants. Although the cost of the hardware will decrease in the coming years, the costs of developing new medical applications, training, and computer support and maintenance will probably increase.

We cannot expect these foundations to support our efforts forever, and it is not reasonable to expect that other medical schools will have equally generous benefactors. Nor can we continually expect that our efforts at HMS will be justified by the fact they are popular and seemingly effective. There is a legitimate concern about any innovation that would increase the already high cost of medical education, unless other educational costs that could be decreased are identified. If information technology is to be successfully incorporated into the curriculum, the issue of cost allocation needs to be resolved.

The HMS faculty also must accept such an innovation. Many on the HMS faculty tend towards the conservative view of educational innovation, technical or otherwise, and are doubtful of it until proven effective. The development of good computer-based educational programs will call for significant changes in teaching methods and require many hours of labor.

Derek Bok, in his 1984 Harvard President's Report on the use of computers in higher education, argued that one of the greatest challenges to university administrators is to "persuade some of the best teachers on the faculty to take an active interest in the new technology and give them the funds and technical help they need to develop imaginative applications."

Our experience thus far strongly supports this analysis. Implementing new technology requires not only new applications, but also convincing the faculty to integrate the computer-based programs into the curriculum. Often our best successes have come from making the programs easily available to students on an ad hoc basis, and then letting the students promote the use of the program.



In the same President's Report, Bok also emphasized both the importance and the difficulty of evaluating the use of information technology in education. He cited arguments that generally run along the lines of, "research on the subject is extremely complicated, the goals are generally in dispute, the methodology still quite primitive, and the relevant variables numerous and hard to disentangle."

At this stage, we have measured the program's effectiveness by the attitudes of the students themselves to the educational usefulness of the technology. Improved student motivation and greater self-direction in learning are, after all, key objectives of the new curriculum. A self-evaluation is one legitimate tactic to assess whether these goals have been achieved.

The next phase of the evaluation will be immeasurably more difficult. The real issue is to assess to what degree, if any, computer education is superior to classical education in promoting critical thinking, in helping to understand complicated materials, in enhancing motivation, and in increasing comprehension.

Harvard Medical School has made a very significant commitment to the use of modern information technology in its continuing efforts to improve the curriculum. The first few computer-based educational modules have been well received by both students and faculty. The major challenge of the next few years will be to broaden the spectrum of our program and to more fully integrate the computer applications into medical education. It would be a mistake to believe that computers are a panacea, but it would be a bigger mistake to underestimate the possible benefits of more widespread use of information technology in medical education.

At the same time, we must continue to realize the danger of placing too much emphasis on content which can be encapsulated in technology, at the cost of ignoring quantitative and social issues which are not so neatly programmed into a computer. There will always be an inherent tension between the technological and humanistic aspects of medical education and medical care.

The development and optimal use of educational software is an iterative process. We have learned much, but are keenly aware of how much remains to be done. It would be premature to attempt to evaluate the usefulness of the computer applications at this time; however, all of us involved with the effort are very encouraged so far. We believe the improvement of the HMS curriculum is an exciting and promising challenge. The appropriate technology is available today, and the time is right to proceed with the full exploitation of this technology in the HMS curriculum. □

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TEACHING ALONG THE NEW PATHWAY

by Cecil H. Coggins

"Is this the hexosemonophosphate shunt?" The student standing at the blackboard addressed the six others sitting around the table in the tutorial room; he was looking specifically at me. I considered answering the student's question and decided to remain silent.

The course was Matter and Energy, which for New Pathway first-year students included much of the material traditionally presented in physiology and biochemistry. The year was 1986. In "real life" I am an MGH clinical nephrologist who rarely thinks about details of carbohydrate metabolism.

Here, as the students' tutor, I had to prepare for the job not only by reviewing biochemistry, but also by trying to learn small-group teaching methods. I listened as two students argued for and against the indicated pathway being the hexosemonophosphate shunt, while a third looked it up in the biochemistry text on the table.

New Pathway Director Gordon Moore had asked me, before this experience as a tutor, to direct the design of a new pathophysiology sequence to be called Human Systems, for the second half of second year. I was not convinced that a tutorial-centered, case-based program was the remedy, but my increasing awareness



PHOTO BY JERRY BERNDT

of a curricular malaise made me eager to take on the job.

It seemed to me that recently many second-year students had been overcome by an anxious passivity. They sat for hours in an amphitheater—silent, nameless faces, filling notebooks with classifications and lists from lectures, text, or a 'camel.' Learning was a grim process, without much room for fun and speculation, and with considerable resentment toward the faculty who pummeled them with endless facts and details. They had few questions other than, "Will this be on the exam?" and unhappiness when asked to think out loud in class.

While painting this bleak picture, let me say that some of this has always been true. It does not describe the experience of bright, venturesome, and confident individuals in each class, nor does it recognize that most students recover from the malady by their fourth year. Nevertheless, it seemed to me and many others on the faculty that a change from rote memorizing to an active learning process—wrestling with concepts, reasoning from the known to the unknown, and from cause to effect—was bound to be beneficial.

But what about the unanswered question in the tutorial classroom? Was my silence helpful or merely a gimmicky, self-conscious obstruction of the learning process? Do the students acquire their huge tuition debt for the opportunity to teach themselves? Many of the faculty are disturbed to hear the choppy and uncertain progression of a tutorial group; they compare it to the smooth, detailed, accurate, and sometimes witty flow of a lecture (particularly their own). The difference is striking.

What counts though is what the students hear and retain and use, not what the lecturer presents. That difference is striking too. Will New Pathway methods lead to better understanding and to an ability to use medical science in practice, teaching, or research careers? The answer remains to be heard, but the question was clearly in our minds when we first approached the design of Human Systems.

The committee formed for this purpose included various internists, a pathologist, pediatrician, pharmacologist, radiologist, and a New Pathway student. We were young and old, traditional or innovative, male and female, and almost all experienced teachers in the "classic pathway." We also felt free to begin with a clean slate. It soon became clear that we would depend heavily on tutorial-based case studies, but that the cases would be complemented with lectures, labs, and conferences. To illustrate what evolved, I will describe a typical week in the Human Systems course.

Each week's discussion centers on a written case prepared for the course, which is based on a real patient. These cases are similar to office or hospital records with history, physical, lab, x-ray, social, psychiatric, and occupational information. The initial evaluation and follow-up over time are presented in several pages.

The week begins at 10 AM on Friday morning, when the first pages of the written case material are handed out in a "tutorless tutorial." The students go over the material without their tutor, identify central problems, review what they already know of the subject, and plan their main areas of study over the weekend. From 11 to 12 the class attends a pathology lecture introducing the diseases and classes of pathology that pertain to the subject organ.

Meeting with their tutor on Monday, the group reviews the material studied, answers the questions identified as key problems, reads more of the case, makes hypotheses about causes, treatment, and prognoses, and plans the next period of home study.

We also supply them with various suggested resources—from current journals, reviews, and texts to specialists on the faculty who have agreed to meet with students to answer questions or explain difficult points. In addition, the main learning objectives identified by the case writers are presented. The tutorial is followed by a lecture on a topic complementing or supplementing, but not duplicating the case material.

Tuesday morning consists of a pathology laboratory session based largely on biopsy specimens with accompanying written "mini-cases," and the week's Patient/Doctor conference. Wednesday repeats Monday's format with the tutorial group meeting to continue work on the week's case, again followed by a complementing lecture.

Thursday includes either a radiology conference—with films from the week's case, related images, and discussion of imaging technique—or a pharmacology session devoted to a class of drugs encountered in the week's case. Emphasis is placed on the mechanisms of drug action, altered kinetics in disease, and approaches to therapy, rather than detailed prescribing information.

The study week is completed on Friday morning with a Friday Professor conference in which a faculty member who has not been involved in the week's teaching comes to meet informally with the students to answer and ask questions, and to tie up loose ends.

Recruiting tutors was not easy. When applicants realized they would be asked to teach (or assist students' learning) in areas that were not their own particular specialty, their enthusiasm often waned and they would ask if they could help in some other way. Nevertheless an excellent group was assembled, ranging from a professor and department chairman to a senior fellow in a medical subspecialty.

The course was presented in 16 weeks between February and June 1987, and both students and faculty reported it to be quite successful. A truer measure of success will come with observation of the students during their clinical clerkship years and perhaps later when they enter their eventual careers.

If a true evaluation awaits further experience and the objectivity of an historical perspective, what can be said now about the course or the method? First, the students in the new program are individuals, with voices, opinions, and personalities that are clearly apparent to their teachers and classmates. This allows for guidance and evaluation on a frequent, personal basis. They seem, for the most part, happy and enthusiastic. Their anxieties, while not totally gone, have shifted to reflect their being the pathfinders—the trial group in the new system.

Course planners and tutors, too, need to acquire unfamiliar skills. They need to trust the students' motivation and organizational ability. They must

accept the impossibility of transmitting all medical knowledge, and substitute instead the development of a solid framework of information, skills, and habits to encourage a lifetime of active independent study.

I found rethinking my role as a teacher in the tutorial setting quite difficult, although the suggestions and coaching from the staff of the educational development office were invaluable in making this adjustment. I cycled between being too quiet and remote, to participating and leading too actively. On one "renal day," when the students regarded me as an expert resource, things went quite badly. They sat down, shut up, took out their notebooks, and waited for me to tell them what to think. This total reversal vividly impressed me with the superiority of their usual talkative interaction with each other on the material.

We cannot yet say that the New Pathway is an experiment that succeeded, for the results are not in. I am sorry that both the truly experimental New Pathway and the truly familiar classic curriculum are ending with the present move to an untested "common pathway" that lies somewhere in between. I am sure the goals of active and independent study are the right ones, however, and am cheerfully aware that there will never be a "final pathway" at HMS. Only a constant reexamination by thoughtful faculty and students will assure a curriculum effective in meeting the demanding and changing needs of today's medical careers. □

Cecil H. Coggins '58 is associate professor of medicine at HMS and clinical director of the renal unit at MGH. He also teaches in the Division of Health Sciences and Technology.

Behind the Scenes



PHOTO BY ULRIKE WELSCH

Gordon T. Moore '63—the person principally responsible for making "new pathway" theory a reality—also exemplifies the exuberance of a convert. Initially skeptical about the value of small-group, problem-based learning, Moore says he is now fully persuaded that the curriculum changes introduced at HMS offer a better direction for medical education.

"This method of learning has achieved fundamental differences not only in what students have learned, but also in how they learn and how they learn to learn," says Moore.

Several faculty committees had already defined the general educational goals for HMS when Moore was appointed director of the New Pathway Project in 1984. Working with the 100 to 200 faculty who made major contributions of time and expertise, Moore coordinated the program design, development, and implementation. "We had a wonderfully exciting time working the program through, arguing, and discussing how students learn best and faculty teach best," he recalls.

The curriculum they developed was unveiled in the fall of 1985, with the first group of 24 students enrolled as members in the prototype society, the Oliver Wendell Holmes Society. Now starting this year, all medical and dental students will be learning the basic sciences by methods Moore refers to as "a responsible balance of the new and the traditional."

Was the timing right to adopt these new learning methods schoolwide? "It's difficult to know when timing is right," Moore responds. He paraphrased Goethe who once said that sometimes creative possibilities are only evident when you have made that first leap into the unknown. "I don't think it's ever possible to move ahead fully prepared. Part of the fun is to modify as necessary as you go along."

There is no New Pathway office anymore, and rising in its stead is the Office for Educational Development and Support. Moore declined to continue as director, but is not straying too far from medical education. One project—for which he has a Department of Education grant—is to evaluate the HMS new pathway experience and determine how other educators may benefit from it. He is also interested in exploring how managed health care systems like HMOs can become "potently involved in medical education." Additionally, he is trying to develop a "simulated practice training lab" as a diagnostic instrument to assess physician competence at all levels of experience, something he likens to the "Link trainers" that pilots use to simulate real-life challenges in the cockpit.

Other medical schools have made curriculum innovations, but Moore points out that HMS is the first research-based school to redefine all four years. "The educational approaches we have used are a unique mix of aspects adapted from other schools and elements we designed which are quite new." The result is a creation that Moore believes may be of widespread benefit to medical education. □

—Ellen Barlow

LEARNING THE "NEW PATH" WAY

by Emily Koumans

For two years we have assembled in groups of six with a tutor—three times a week—to discuss, learn, and teach the basic science material presented in cases. We in the New Pathway have struggled with the case of the "unlucky basketball player," explained and drawn on the board the process of nucleotide replication, and listened to "expert resources" explain pathophysiology from AIDS to zoonoses.

What words adequately describe this new teaching and learning method at HMS? How different was it from the "classic curriculum?" If we had it to do over, would we make the decision to participate again? What has it been like to go through this educational process without knowing where it would lead?

As student participants in the first class of the "New Pathway," my 23 classmates and I have explained the curriculum many times to other students, faculty, friends, and relatives. While we have all come to some understanding of the structural changes in the new curriculum, the implications of these changes are still hotly debated.

I can accurately write that there are 23 different opinions in my class, that each person we talk to forms his or her own opinion, and that the long-term implications, if any, have yet to be identified. While I can't speak for every student, I can describe the experience of the first two years in this pilot educational program, as well as some of the short-term implications it has had for us.

The first two years of medical school have always been more than a time to learn the factual knowledge necessary to become a physician. Although students traditionally spend a great many hours in lectures and in studying the basic sciences, they also learn how to approach medical problems systematically, to regard information critically, and to identify issues in a disease that can be elucidated by basic science research. This remains true in both curricula.

In a tutorial, however, the emphasis changes from learning many facts to arriving at an understanding of a disease process. The tutorial even differs from a conference or seminar session led by a faculty member; we never cover as much material as a faculty member could cover in the same amount of time.

After reading aloud the first part of a case, we students talk amongst ourselves:

"It looks like the mother is very anxious about her baby."

"Maybe, I mean her baby's behavior has changed, and he's had diarrhea for three days; 15 to 20 times per day is a lot."

"Yeah. But if every mother who was anxious about her baby came to



A student works independently in a "skills area," where microscopy, wet labs, and computers are located.

the ER, there would be hundreds of mothers outside Children's."

"But do you think in this case it's justified?"

"Plus, he has a temperature. What else differentiates this episode of diarrhea from the others when he was just born?"

"Why does anyone get diarrhea? What causes diarrhea?"

"Maybe we should follow up on that question," the tutor interjected. "First of all, what is diarrhea, then, what can cause it?"

Each tutor and group of students had their own dynamic. Some tutors said hardly anything at all, and others were very generous with their knowledge. Students and tutors could be either active or passive in guiding the discussion. In "The Airline Pilot's Collapse," for example, our tutor could help us in both understanding pre- and after-load heart failure, and in deciding what might be good to discuss in the next session.

As we got used to the tutorial setting, we found that the purpose of a tutorial was not necessarily to cover all the material raised by a case. (This had created a lot of anxiety for both students and faculty.) We had to prioritize and choose the topics we felt could and should be covered. Tutorial time was precious; we felt that since we needed to learn so much, those hours with a faculty member had to be used optimally. Prioritizing, planning, and setting the agenda for the next tutorial forced us to work together, and it quickly became an important part of the tutorial itself.

"We didn't find writing tables on the board useful at all in the last block; it was just a distraction from the real subject."

"Yeah, they were utterly useless, took too much time, and we could see it in the book anyway."

"Well, does anyone have a suggestion that would use our time more effectively?"

"How about. . ."

At this point in the discussion, we might end up making a table on the board anyhow, but not one that had been previously assembled in a book we had read. We might find an alternate manner to compare disease processes, or we could decide that further investigation of one disease would be most beneficial. By our use of cases, by driving the agenda of the tutorial ourselves, and through our exposure to clinical medicine in the Patient/Doctor block and Clinical Skills, we had already begun to learn how to approach patients and their problems, even before clerkships.



Charles Carpenter introduces first-year students to the tutorial method.

PHOTOS BY ULRIKE WELSCH

Tutorials, tutors, and students, as well as lecturers and lab instructors, came under scrutiny. Ostensibly, our goal was to improve our education, and to maximize the positive aspects of our learning environment. Often in groups of six, and occasionally in the larger group of 23, we came up with plans to best suit the majority.

I am thankful that we were allowed to make mistakes. In most of our endeavors, in both the basic science and the Patient/Doctor curricula, we spoke not with one voice, but with many. This ironically became a sort of reassurance for faculty and administration. If we did agree on an issue, it usually meant that a change needed to be made.

In the spring of our first year, we organized a retreat, in part to reinforce our solidarity. Some still marvel that we had such high attendance on a Saturday! The eight women of OWHS '89 also successfully petitioned for single-sex tutorials during one block of the curriculum. Through all of this work, we inevitably got to know each other very well. I am hard-pressed to say why I find it easy to work with other New Pathway students. Is it because I have worked with them before, because I know them well, or because we have gone through similar experiences?

We have also become accustomed to giving and receiving feedback on *everything*, from lectures to labs, tutors, blocks, the white/blackboards on the walls, other furniture, the rugs, the coffeepot, and anything else in between. Some of us have been much more active than others in this respect.

We have "grown up" the last two years in a different educational culture. It has a different language (tutor, block, case), and the words have been imbued with different meanings. We have had different evaluations, which I hope have affected our values in a positive way. Our behavior, both in and out of the clinical setting, has been shaped by excellent examples from throughout Harvard. I and (I think) my classmates, have approached the clinical years with eagerness, yet also pleased that we spent our first two years in the OWHS "New Path."□

Emily Koumans '89 is a member of the Oliver Wendell Holmes Society. She is also on the Bulletin's *editorial board.*

From Both Sides Now

HST Bridges Science and Medicine

by Elana Doering

I did not enter medical school through the usual door. Five years spent earning a PhD in physical chemistry at MIT took me out of the neighborhood entirely and made me, in the minds of many medical school admissions committees, a bad risk. Then the MIT/HMS Health Sciences and Technology Division (HST), which takes such risks routinely, opened the window . . . leaving me four years to figure out just where I had arrived.

It turned out that I was not entirely among strangers. Most of my 26 classmates had spent time in laboratories, and many had worked on, or completed, advanced degrees. Mathematics, engineering, and physical science students comprised a large portion of the class. Conversation on the Longwood-Cambridge shuttlebus rang pleasantly familiar—a post-doc wished she had time to read journals, and a physicist tried to will human anatomy into a sphere.

The composition of my class should not have surprised me; HST was established precisely in order to involve such people in medicine. The division, established as an MIT/HMS collaboration in the '70s, trains students (and grants graduate degrees) in medical engineering and physics as well as medicine. Since the MD program includes some fairly quantitative-oriented courses as well as a thesis requirement, some self-selection of students naturally results. We did get along quite well, we told each other as we rode the shuttlebus—it was only too bad more of us didn't have cars.

Many of my classmates shared my apprehension about the medical studies ahead. We weren't good with facts; we were used to problem sets. I was especially worried because my last lecture course had ended five years before. I memorized badly and fell asleep in lectures. I refused to write in books and didn't own a highlighting pen. All these 22-year-olds, I thought, have been doing this sort of thing all along; I've been spoiled by years of independence.

"I am not a scientist," a pediatrician replied, "so I'll stick to the important points."

My fears were well-founded, which is all I will say about my performance that first semester. However, HST offered a number of solutions to my problems. During fall semester, for example, the anatomy professors refused to let me sleep through lectures: the anatomy 'camel' was only an outline and we had to fill in the details. The pathology course had question-and-answer 'conferences' that evolved into case discussions, and still other courses had problem sets. In the spring, our physiology courses combined traditional lectures with small group sessions devoted to problem solving, student-run case studies, and student seminars. By the end of the year, I felt very involved in the program, and we all had a fine time debating the merits of each new curricular innovation.

Meanwhile, we were being introduced to the greatest novelty of all: the HMS environment. We all began medical school eager and excited about entering the world of patient care. Since my HST group tended to have laboratory rather than clinical experience, we were especially wide-eyed as we roamed the hospitals with our HMS tutors and classmates. We also welcomed the chance to meet HMS classmates in the clinical tutorials. (See you on the wards, friends, whichever societies you're now in!)

I observed no barriers to our interactions with the rest of our HMS class. Our HST group couldn't share quite the same daily comeraderie with the entire Class of 1990, but we made many connections. In and out of school, our common identity as medical students continues to bring us together much more than differences in our curricula divide us.

Divisions do exist between scientists and physicians, however, and HST provides a unique opportunity to observe them. Our professors range from electrical engineering researchers to clinical endocrinologists, and our classroom and research-lab colleagues, from physics graduate students to pathology residents. As an HST student and a postdoctoral scientist, I enjoyed the privilege of being considered a part of all these worlds at once.

In laboratories at both MIT and HMS (in or out of HST) I saw problems when graduate students, medical students, PhDs, and MDs worked on the same projects. Graduate students tended to envy the security, and medical students the freedom, of their labmates. In moments of doubt, each worried that the other had chosen a better path. Meanwhile, postdocs saw that PhDs and MDs were far from equivalent in the eyes of the agencies funding grants. Inequality of funding creates similar problems in all research settings, but I noticed that HST makes an effort to alleviate them. It is supportive of graduate students and PhD researchers, and it provides funding to medical students who make a commitment to research.

Other evidence of interdisciplinary rivalry surfaced only in passing remarks. "I am not a scientist," a pediatrician replied to a question about blood gas units in a general HMS class, "so I'll stick to important points." An HST physiologist finished an explanation with, "Now you can go tell the doctors how it works." I thought I heard derision (or was it defensiveness?) in both voices. Still, both speakers were generous and dedicated workers and fine teachers in their own fields. Perhaps, I thought, we have to tolerate the excesses of professional enthusiasm to benefit from it.

In any case, these excesses are not much different from those I had encountered in my university experience. All good researchers I know have an emotional investment in their work. Scientific arguments can be spirited affairs, and direct challenges between colleagues may be events that graduate students sneak into the room to hear. Our emotional involvement supports and rewards us, and if we're convinced our work is more worthy than that of the lab next door, so much the better.

I observed less caution about offense between the basic research and clinical worlds, however, than I was used to within research environments. Perhaps these worlds used to be so separate that each could get away with ethnic jokes about the "alien" others. At HST, however, we are formally in each other's backyards, and we are also increasingly connected in the larger research/medical community.

The benefits of science and engineering collaborations with medicine are evident. HST itself has trained many of its own current faculty, whose research ranges from mathematical modelling of neural networks to laser use in cardiac surgery. The heterogeneity of our environment enriches our individual experiences as well—my HST colleagues can testify to that. We do need to work a little harder at getting along though. If we are considerate and open-minded, we can contribute to interdisciplinary appreciation in a community blessed with many windows, through which both diversity and talent flow. □

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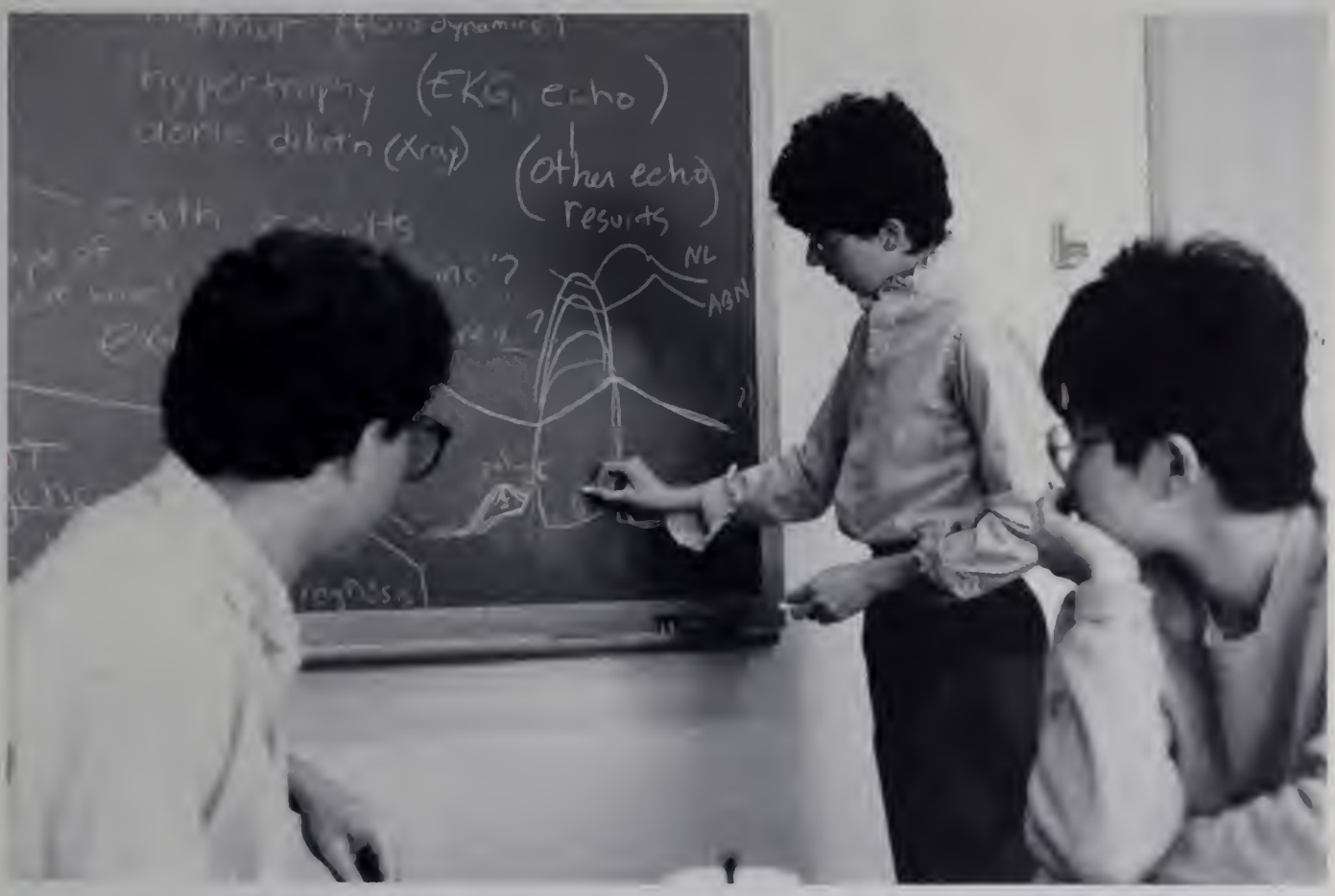


PHOTO BY MARGO WOODRUFF

The author leads an HST case study tutorial in cardiovascular pathophysiology.



First Confrontation with Cancer

Lessons Only Patients Can Teach

by Steven P. Seidel

Early in June 1986, I entered the radiation oncology unit of a large, northeastern hospital for the first time. I noticed the architecture first: an enclosed cement staircase spiraled into the depths, out of view from the comfortable, spacious, and warmly furnished waiting area. Doubtless the architect had other intentions, but as an outsider, the symbolism seemed striking.

The descent of the staircase seemed to represent a one-way journey into the unknown. Perhaps it was my first-day jitters, but I suspected that patients might feel the same way arriving for their first radiation treatment. It seemed that my own fear and nervousness on that first day might mirror the emotions of new patients.

When Tom Csordas, a medical anthropologist, and I descended the last stairs, I got my first look at the place I was to spend the summer interviewing patients with cancer. Soon my eyes were drawn to the waiting room where a large number of people sat, many old, some middle-aged, and a few younger than myself. Unconsciously, I assumed that the younger ones were just relatives or friends of patients. My preconception that cancer strikes only the elderly had not been dispelled by my one year of medical school. It was not until I interviewed two terminally ill patients younger than myself that the lecture-hall epidemiology became clear.

At the beginning of the summer I had been in search of a summer job that offered patient contact (a term first-year students bandy about *ad nauseum*). Patient contact suggested something far removed from the boredom of first-year lecture courses, something almost magical. So when I saw the notice describing a summer research project involving cancer patients and promising a chance to see and talk with real, live patients—no experience necessary—I jumped at the chance.

The purpose of the study was to investigate doctor-patient communication, truth-telling, and how patients discuss the sensitive issues surrounding cancer. I found the issue of truth-telling especially fascinating.

Studies have shown that, in the 1960s, a majority of physicians felt that cancer patients should *not* be informed "truthfully" about their diagnosis, much less prognosis. Today, however, the vast majority of doctors

The descent of the staircase seemed to represent a one-way journey into the unknown.

ILLUSTRATION BY DAVID SCHUSTER

advocate the "patient's right to know." I wondered if there were discrepancies between what physicians advocate and what they clinically practice. After all, no one wants to be the bearer of bad news.

I also wondered how I would react to interviewing patients, especially seriously ill patients. Could I conduct a proficient, compassionate interview? Would the patients respect me if they knew I was not yet in my second year at medical school? And what about the staff? Would I seem like an intruder to them? I breathed a sigh of relief when I realized that Tom and the other researchers had already established contact with the nurses and radiation technicians on the unit.

It didn't take me long to realize that almost nothing got done in the unit without the nurses and radiation technicians. Sure, the radiation oncologists determined how much radiation and how and where the beam was to be directed, but if they did the prescribing, the technicians and nurses ran the operation.

I was soon introduced to the three nurses who would be my patient contacts: Jane, Marge, and Kathy. (It struck me as unfair and inequitable that physicians are addressed as Dr. So-and-so while nurses are always called by their first name.) These three were to approach patients and ask if they would consent to an interview with me.

I breathed another prayer of thanks, grateful that I didn't have to approach patients myself and convince them to take part in our study. These patients were sick and needed treatment, I reasoned, not an interview with me. In the weeks that followed, I found out just how wrong these initial fears had been.

Buried in the mass of paper in each chart was usually a simple phrase, the impact of which I felt was profound. . .

I don't think it's possible to overestimate the importance of the radiation technicians who administer treatment. These technicians come to know the patients personally, and they do a fantastic job. Over the summer, patients told me a lot about their experience, some of it good and some bad, but they never had anything but the highest praise for the radiation technicians.

I particularly liked Kevin, a technician who was a very sharp dresser. One morning, just as he wheeled a recalcitrant patient who seemed to hate the world out of treatment, she vomited all over his new Gucci shoes. Without even glancing down, Kevin turned immediately to the patient.

"Are you alright?" he asked. "Nothing to worry about; it's just a side effect of the radiation. I'll have this cleaned up in a minute." I suppose his reaction was as expected, but I couldn't be sure what I would have done under the same circumstances.

One had only to look around the technicians' work area to get a feel for how patients valued them. The wall space was literally plastered with thank-you cards, drawings, poems, and snapshots from their patients; and their counters were often covered with boxes of candies, home-made cakes, and pastries.

When Tom informed me that we were to interview a patient that morning, I followed him around like a timid mouse. First I had to read the patient's chart. This was my first time checking charts, and I felt uneasy, privy to someone's deepest secrets. Each chart turned out to be a goldmine of information though, invaluable to forming questions for the interviews.

Buried in the mass of paper in each chart was usually a simple phrase, the impact of which I felt was profound: "Aim of treatment—Curative/Palliative." When palliative was circled I felt the physician had decided that patient's fate instead of commenting on its probable course. I wondered if there were any hope for the patient whose treatment was palliative. How does this designation alter the treatment that patient receives? And does the physician inform the patient honestly about the prognosis?

In numerous interviews that summer I found that a typical comment from a "palliative" patient was: "I'm getting better every day; I know I'm going to lick this thing." I couldn't help wondering whether their physician had been completely frank with them, or whether it was just denial on their part. A number of these patients told me that they would have found it nearly impossible to accept the diagnosis of cancer if they had been told it was terminal. While I don't believe anyone should be left without hope, I couldn't convince myself that ignorance was bliss in this case.

On our first morning, Tom introduced me to Ms. B and led us both to a small examination room. Tom's friendliness and easy manner helped relax Ms. B, and he quickly generated an intense discussion about her illness, treatment, communication, and miscommunication with her doctors. I was impressed that Tom was

able to ask crucial questions which might never have occurred to me.

Tom interviewed three patients with me present that first day, and each patient was equally fascinating. I found the interview format to be the most intellectually engaging exercise in my limited medical experience. When I interviewed patients myself, my mind never wandered, and at various times I felt I was playing the part of historian, psychologist, sociologist, friend, and sometimes even doctor.

Ms. H was my first solo patient. She was a 70-year-old woman with breast cancer who didn't look a day over 50. Her attire and manner were those of a wealthy, self-possessed woman, confident about her ability to handle people. Her voice was reassuring, even soothing, with the slightest hint of a Southern drawl. At first, I felt lucky to have drawn such a pleasant, cooperative patient for my first interview and I charged ahead with the questions.

But just as Ms. H was discussing how cancer had changed her life, this emotional Rock of Gibralter began suddenly to weep uncontrollably. I was dumfounded, and only managed to ask, "Would you like a tissue?" It took some time before she regained her composure and was able to complete the interview.

Afterwards, I felt guilty and embarrassed that Ms. H had felt pressured to discuss sensitive issues which she probably would rather have avoided. I must have pushed her too far or offended her with an offhand comment. My first attempt at talking to patients had failed.

Tom pointed out later, however, that Ms. H had cried because of the changes cancer had wrought in her life. (She had given up the chance to divorce her husband and marry another man whom she loved deeply out of a compulsion to spend what she felt were the few remaining years of her life with her children.) Tom assured me that I had not been callous, and after listening to the interview tape, I concurred.

Not only had I misinterpreted Ms. H's reason for crying, but I had falsely assumed that crying was a bad thing. Now it seems natural, even therapeutic, for a patient to cry when discussing issues like these. Indeed, a patient who cries may be indicating that the questions were right on target.

I completed 38 interviews in the succeeding weeks. In each one I learned something about communicating with patients, how patients deal with cancer, and the ambiguities of doing research in clinical settings versus controlled laboratories.

Everyone has a favorite patient, and Dave C was mine. Dave was a wonderfully compassionate human being, and I liked him immediately. He was the first and only patient who ever asked if he could address me by my first name.

When I met him, Dave was 33 and had already suffered a long time. His current diagnosis was pancreatic cancer with a large pelvic mass of possibly metastatic origin, but his previous history included familial polyposis coli which had devastated his family and had first appeared in Dave at the age of 16. In the last 17 years, Dave had undergone 26 operations including a complete colectomy and permanent ileostomy at the age of 21. Twelve years after that operation, Dave appeared again with severe pelvic pain and a 65-pound weight loss. When I interviewed him from his hospital bed, his wife was present as well.

As the interview progressed it became clear to me that Dave was in incredible, almost intractable, pain. At times he gripped the bed railing so hard that his knuckles turned white, while shifting his body in a vain attempt to find that one painless position which did not exist. He often winced and gnashed his teeth, yet made no verbal mention of the pain to me.

"What about the pain?" I finally asked.

"It feels like I'm being cut to pieces with a knife...," said Dave. "Sometimes it quiets down and other times it wakes me up; I'm shaking. It's so painful."

Why was this man doing an interview with me when his entire body was racked by such pain? He didn't owe me anything, and I could do nothing medical to help him. Dave's cooperation was only an extreme example of what I saw all summer long—chronically ill patients going out of their way to help me with my research.

At 33 Dave had undergone more operations and procedures and had suffered more pain than most people would in 10 lifetimes. I admired his courage and his ability to remain cheerful in the face of intense suffering. His inner strength seemed to arise from his relationship with Kathy. She sat near him the entire time, stroking his hair intermittently and staring intently into his eyes.

"Who do you turn to," I finally

At 33 Dave had undergone more operations and procedures and had suffered more pain than most people would in 10 lifetimes.

asked, "to talk about your feelings?"

"Kathy."

"I shouldn't even have asked," I stammered. It was apparent that they shared a special closeness.

"I'd be dead without Kathy," Dave continued. "She's what I really have in this world. You know, I've got a mother and a father; she's got a mother and a father. But we're married, and without Kathy I have nothing. She's my life, my best friend, my bosom buddy, and she's a good pal, a very good pal. (He began to cry.) I don't know what I'd do without her, Steve. I really don't."

"You're lucky," I managed weakly.

"That's the only thing, if I were to die. How would I say goodbye to her and tell her I'm sorry, you know. I would not say goodbye." Kathy began to cry as well, and they embraced each other and wept profusely for what seemed like ten minutes.

How could I have remained so unemotional while they fell apart? I really liked Dave.

I sat there quietly, confused and unsure of how I should react. We ended the interview shortly thereafter because Dave said he felt "a little sore." Afterwards, I sat alone in the interview room attempting to sort out my feelings. How could I have remained so unemotional while they fell apart? I really liked Dave. Wasn't it inappropriate of me not to cry?

I realized later that if I had allowed myself to cry—a response I felt was appropriate at the time—I would have become "concerned" to a deeper extent than is dictated by society and the medical profession for the doctor/patient relationship. I am not convinced that this unwritten professional credo is perfect, but I do feel strongly that both concern and detachment are vital to medical practice. One can only hope that the one is not overwhelmed by the other. I sincerely hope that Dave and Kathy did not mistake my silence for indifference.

Kathy C wrote me some time later in response to a post-interview survey we conducted, informing me that Dave had passed away two weeks after our interview. She expressed her conviction that her husband always went out of his way to help others. I am glad that I met Dave. My interview with him forced me to examine some issues which I suspect will confront me again and again in the succeeding years.

Another patient who taught me a lesson was Ms. W. She had been diagnosed three years before with localized breast cancer, a condition usually cured with therapy. At that time, her prognosis was excellent; the tumor mass had been excised, and she was advised to begin radiation therapy. However, Ms. W had never begun treatment. In fact, she severed all contact with the hospital and staff. All efforts to reach her failed. Now, three years later, she had appeared at the hospital again because the cancer had spread. Tests revealed metastases to almost every major organ in her body, and now her prognosis was dismal.

During the interview I was able to explore Ms. W's reasons for avoiding treatment three years before. I concluded that for some cancer patients, the cure may seem worse than the disease. A cancer like the one Ms. W had often presents only a single, small sign, such as a lump, and no symptoms at all. Such patients have a disease but no illness. For them, ignoring the problem may seem the best defense. Further, Ms. W had been afraid of "radiation," a term with negative connotations in this age of atomic bombs and nuclear power plants.

Slightly over halfway into my 10-week stint, the head nurse approached me to say me that all personnel were requested to wear white coats to keep up professional appearances. Would I wear one please? I found the idea attractive. It would help me blend in, and I wouldn't have to iron my own shirts! So later that day I slipped into a white coat, oblivious of the consequences this would have.

The next day, when I approached Ms. S for the first time to ask about a convenient time for our forthcoming interview, she replied: "Well doctor, I know you're a busy man, so let me know what time is good for you." I was genuinely flattered.

"I'm not really a doctor," I said, opting for honesty, "just a medical student."

"But that means you're going to be a doctor, right?"

"Yeh, I hope so," I said, and we proceeded to find a mutually convenient time for the interview.

"Have a nice weekend," Ms. S said as she left, "see you next Tuesday, doctor."

Ms. S was not hard-of-hearing or forgetful; this kind of encounter was typical the rest of the summer. After I donned a white coat, patients were infinitely more compliant with me. In an egotistical way I came to enjoy it, and occasionally failed to correct the patient if he or she addressed me as "doctor." My newly won influence

made interview scheduling more convenient and may even have induced a few patients to consent to interviews who might otherwise have declined.

The full impact of the change only became apparent, however, when a third-year acquaintance of mine failed to recognize me in the hall. "Excuse me, doctor," she began, "could you tell me where they're doing head and neck examinations this afternoon?

"Mary, It's me, Steve."

"I'm so embarrassed," she said, acknowledging her mistake.

I found the white coat incidents amusing and harmless, though it disturbed me that everyone seemed to have such a stereotypical view of who a doctor was, and that this influenced so strongly how they treated others. Clearly, a male in a white coat is a physician, and I suspect a female automatically becomes a nurse or technician. Noting my age, several patients asked if I were spoken for yet. One even mentioned that he had an available daughter. Too bad we can't all don white coats in our dealings with other people.

One concern of our research team as we began the study was that patients might find it difficult, even psychologically damaging, to talk about the sensitive issues surrounding cancer. I shared these fears with the others. If my interviews proved painful for patients, I knew I wouldn't feel comfortable doing the research.

Some of my fears were alleviated by Mr. W, a pleasant, robust 68-year-old retiree recently diagnosed with advanced prostate cancer. A few days after I interviewed Mr. W, he approached me timidly in the hall, his fists clenched tightly around the brim of the hat he held waist high.

"Excuse me," he said. "Do you remember me? You interviewed me the other day. I just wanted to let you know how much I enjoyed talking to you. I'm not one to talk much about my feelings. It was good for me to discuss some of the things on my mind."

Comments like this sure made the job more rewarding. I was aware of the fact that patients undergoing radiation treatment often feel helpless—cancer seems overwhelming. Their treatment regimen consists of remaining passive and motionless for several minutes while a complex and forbidding machine showers them with invisible rays.

Something as simple as an interview gave these patients the feeling of active participation in their treatment. Mr. W's comment turned my prior concern about patient reaction to the interview completely on its head.

In the days that followed, so many patients expressed similar feelings that we decided to assess patient reaction to the interview more objectively by adding a final question to the interview. "How do you feel about doing an interview like this?" I would ask.

The results of our original query into patient reactions were so homogenous—patients stated that they were either glad to discuss these issues with a sympathetic party, or that they didn't feel the need to talk but were glad to help our research—that we decided to document it with a post-interview questionnaire.

The response to our mailing was impressive. Eighty-two percent of patients returned the questionnaire: 98 percent found the interview a positive experience, and 100 percent indicated that they were glad to have been able to participate in the research. These results made me feel that it had been a summer well spent.

As the summer ended it was time for me once again to join my classmates and return to the lecture halls. I finished my last interview and said goodbye to the nurses, technicians, and staff. But the real work had just begun. The compilation and analysis of data took several months to complete, certainly the less glamorous side of research of this sort. But I am glad to have been part of the project from beginning to end.

The interview format allowed me to concentrate on the non-medical issues of concern to patients. In retrospect, I feel privileged to have been able to view the world of cancer treatment and cancer patients from the inside. That perspective fascinated me while it challenged me to develop my own style for dealing with patients and the system—a challenge I met with varied success.

I still have not sorted out my feelings about Dave C. Maybe I never will. Many of the patients I interviewed taught me things that transcend learning in books. They will be with me for a long time. I look forward to similar experiences in the future. □

Noting my age, several patients asked if I were spoken for yet. . . . Too bad we can't all don white coats in our dealings with other people.

Steven P. Seidel '89 is a student in the classic curriculum. This essay describes his role in research conducted during the summer of 1986 by the HMS department of social medicine under the leadership of Mary-Jo Good, PhD.

Days in a Life:

Dr. Aub, Huntington Hospital, and Cancer Research

by Nancy L.R. Bucher

This is my story of Dr. Aub—always Dr. Aub to me, not Joe Aub—and the John Collins Warren Laboratories of the Collis P. Huntington Memorial Hospital where I worked for more than 30 years.

Joseph Aub was born in Cincinnati in 1890. He entered Harvard College weighing 87 pounds, was cox of a crew, and undertook his first research project—how the flounder's eye migrates so that both eyes are on the top side of its head, presumably to see better. He went on to Harvard Medical School after only three years in college.

As a medical student he worked in the physiology laboratory of Walter Cannon on the effects of epinephrine on the gastrointestinal tract. This led to his first publication and a lifelong interest in metabolic disease. He also spent a summer with the Grenfell Mission observing the ravages of widespread beri-beri and pellagra among the fishermen of Labrador, and an Eskimo population decimated by diseases introduced by the white man.

Before graduation from medical school, he began his internship at Massachusetts General Hospital, where as a student he had attracted attention by a spectacular diagnosis of leprosy.

In 1915, he worked with Eugene DuBois and Graham Lusk in New York. DuBois was a tough taskmaster. He didn't like zeros to look like sixes in laboratory notebooks, and he made Aub sit and practice writing them until he was fully satisfied with the performance. It made a deep impression—so deep that Dr. Aub told me about it several times, although 30 years had elapsed by the time I came to the Huntington Lab.

The focus of the DuBois lab was the study of basal metabolism and calorimetry applied to humans. Aub dealt with the basal metabolic rate of dwarfs and legless men, as well as patients with exophthalmic goiter. The work intensified his interest in the metabolic effects of endocrine glands, and he began to study circus people: pituitary dwarfs, chondrodystrophics, and giants. Many became his friends and long-time patients.

Among his favorites was an acromegalic, "The Ugliest Woman in the World." The title was bestowed upon her by a London newspaper, which ran a competition to spoof American beauty contests. This dubious honor made her very happy. She had been a poor, struggling seamstress, trying to support a raft of young children, and this award won her an immediate offer from a circus—she had only to sit and be admired by a crowd a few times a day. She was friendly, the crowd was friendly, she had a good time, her children were well looked after, and she became famous.

Eventually, the pressure of the pituitary tumor on her optic chiasm began to affect her vision, but she refused an operation for fear she would become more beautiful and lose status and her job. Dr. Aub finally persuaded her to see Harvey Cushing. When Cushing's secretary asked her name, she merely said, "The Ugliest Woman in the World." She had abandoned her former identity completely.

In 1916, Aub returned to MGH as a medical resident. There had been no such position before. He studied the effects of hyperthyroidism on electrocardiograms with Paul Dudley White, and the two formed a lifelong friendship. When the United States entered World War I, Aub went with the MGH unit to France, where he became interested in shock.

After the war he returned to

work at MGH, and also in Walter Cannon's laboratory. He did so against the strong advice of several leading clinicians who had advised him that physiology was so remote from disease that immersion in this subject would ruin his career. In retrospect, he regarded those six years in physiology as perhaps his most valuable training, for it awakened a fascination with the mechanisms of disease. In the laboratory, he pursued his studies of shock and showed that low venous oxygen tension was the best sign of impending danger.

In 1924, Dr. Aub was put in charge of Bulfinch Ward 4. David Edsall—who 12 years earlier had become the first non-Bostonian to be honored with a named professorship in medicine at HMS and made chief at MGH—was instrumental in establishing this ward on the ground floor of the Bulfinch building. Edsall was greatly admired by Aub, who later co-authored a biography of him.

Ward 4 was an innovative facility for thorough metabolic studies of selected patients. Edsall put Joseph Aub in charge with the assignment of studying lead poisoning. Pioneering work by Alice Hamilton, who was later to become the first woman to attain faculty rank in Harvard University, had shown lead to be the leading occupational hazard in the United States.

Dr. Aub showed that the metabolism of lead paralleled that of calcium, that parathyroid hormone would promote both calcium and lead excretion, and that calcium could relieve lead colic. He further observed that lead combined with phosphate on the surface of red blood cells to make them fragile and that this accounted for the development of anemia in lead poisoning. It was a medical landmark, for it explained in terms of fundamental biochemistry the actual mechanism of a disease and its treatment.

His study of lead involved the parathyroid. As a result, Dr. Aub was able to make the diagnosis of hyperparathyroidism in a patient, and he convinced a talented young surgeon, Oliver Cope, to search for the parathyroid adenoma that Aub knew must be present. It was, though it had not been found in five previous explorations.

All, however, was not science. Aub and P.D. White set off to tour Europe and on shipboard met two attractive young American women. One of them came down with measles. Gallantly, Aub and White helped the young ladies elude the French immigration officers. The young ladies happened to be Cornelia Otis Skinner, the actress, and Emily Kimbrough, the writer. They described the episode some years later in *Our Hearts Were Young and Gay*. The book became an instant best-seller, complete with the names of the two helpful doctors, who by this time were both distinguished Harvard professors and ostensibly greatly embarrassed by the revelation.



Joseph Aub

In 1928, Joseph Aub succeeded George Minot as chief of the Huntington Hospital. This institution had an interesting history. In 1899 Caroline Brewer Croft had left Harvard a substantial sum of money in trust to study cancer. Her attitude was forward looking for the time. To supervise this work, the President and Fellows of Harvard University established a Cancer Commission composed of nine distinguished doctors with J. Collins Warren, chairman.

Ten years later, Harvard received a large gift from Mrs. Collis P. Huntington to build a cancer hospital in memory of her late husband. As a young man, Collis P. Huntington had gone to California in the goldrush and staked a

claim with his partner, Leland Stanford. After digging for a few days, they tore up the claim and sold shovels instead. They had the Midas touch. Collis P. eventually amassed a large fortune building railroads.

In 1912, the Collis P. Huntington Memorial Hospital with Ernst E. Tyzzer as director opened under the control of the Cancer Commission. It was located at the corner of Huntington Avenue and Shattuck Street, next door to HMS. The names Huntington Avenue and Huntington Hospital are purely coincidental.

The aim was to provide a homelike atmosphere for patients who were terminally ill. A number of novel features were incorporated for their comfort, and there were extensive treatment facilities and well-equipped laboratories. To reward the devoted efforts of J. Collins Warren, who for many years had been the moving spirit of the Cancer Commission, the laboratories were named in his honor.

Notable developments soon emerged from this institution. It was one of the first places in the United States to use both x ray and radium in the treatment of cancer, to devise methods for their safe administration, and to define the unit of radiation, which William Duane of its staff named the Roentgen Unit. Later, the world's first million-volt Van de Graaff x-ray treatment machine was designed and installed by John G. Trump of MIT.

In 1907, Tyzzer had produced the first evidence that heredity has a role in cancer, at least in mice. At the Huntington, he went on to develop high and low incidence cancer strains, work of fundamental importance that is still of enormous value in cancer research.

In 1925, William T. Bovie, then physicist to the Harvard Cancer Commission and the Huntington, developed the electrocautery for excision of cancerous growths. The instrument was soon adopted by Harvey Cushing.

George Minot had come from the Thorndike Laboratories to succeed E.E. Tyzzer as director, and in 1928, Aub succeeded Minot. The Huntington Hospital had already made its mark, but despite this and Aub's own distinguished track record, his prospects appeared dismal to many leading medical figures. Cancer research was widely regarded as a dead end or box canyon.

Within two years, however, he proposed radical new directions to the Harvard Cancer Commission. "We could probably write many papers if we devoted our time to techniques for producing tumors. Or we might be quite unproductive but have a chance to make really fundamental progress if we studied normal and pathological growth and regeneration." He proposed influencing normal and abnormal growth to learn what fundamental factors were involved. This generated a lengthy and heated discussion, but the Harvard Cancer Commission was open minded and finally agreed to his radical proposal. Country-wide, they were in the minority.

For the next 15 years, Aub's thinking was way ahead of the times and, as a result, money was hard to come by. They were lean years, and much time and energy were required to raise funds. It wasn't until the mid-fifties that the study of normal and abnormal growth was widely accepted as suitable in fundamental cancer investigation.

One important project at the Huntington involved the excretion of radium in painters of luminous clock dials. These patients had ingested large amounts of radium when pointing their brushes with their lips. Nearly all were destined to develop bone cancer. Attempts to promote radium excretion by the methods previously used for lead (to which radium was metabolically similar) were unsuccessful in the chronically exposed individuals, but proved remarkably effective in a physicist who had inhaled radium during a laboratory explosion. This was hailed as a brilliant cure in the new atomic age, and it encouraged subsequent work in the elimination of radioactive substances from other victims of radioactivity.

By 1941, Huntington Hospital had accrued a deficit of $100,000. The decision was made to close its doors and move the laboratories to the MGH where Ward 4 was available for clinical studies and the outpatient department could amalgamate with the MGH tumor clinic, which had developed its own distinguished clinical record since 1924.

Therefore in 1942, with the world at war, the well-equipped John Collins Warren Laboratories of the Collis P. Huntington Memorial Hospital of Harvard University moved into the second floor of the Domestic Building of MGH. The building had previously been occupied by the hospital kitchens, which had walk-in cold and deep-freeze rooms, the envy of the



Joseph Aub, TV show host, Nancy Bucher, and Paul Zamecnik on television in mid-1940s

other laboratories at the hospital. At the time of the move, there were 3,000 pedigreed mice and 400 rats.

During the war, ongoing research projects were set aside and work on shock moved back to center stage. Clostridial toxins were shown to have an important role. There were useful studies of blood preservation and storage for shipment overseas.

I arrived in 1945 at the war's end, fresh from two years as a house officer, in quest of research training. I remember the laboratories vividly. The short corridor leading from the ancient bird-cage elevator had a glass roof. It leaked furiously whenever it rained, requiring an array of dishpans and buckets which had to be stepped over while you dodged the drips. Since there was no air conditioning, we opened the windows wide. One day a pigeon, who had flown into my tiny laboratory and perched on a 500 ml glass cylinder on the top shelf, took off as I came in. I caught the cylinder in mid air. After that I made do with less ventilation.

The professional staff at the time, in addition to Dr. Aub, consisted only of Ira T. Nathanson, a surgeon, and Paul Zamecnik, both from Huntington Hospital. Ted Nathanson was studying breast cancer and had achieved spectacular remissions in some post-menopausal women, but the results were variable and hard to predict. This was exciting, innovative work since there was no chemotherapy, only surgery and x ray. Lewis Engel, an expert steroid chemist, arrived to collaborate on detailed studies of the excretion of steroids in normal and cancer patients. Gallons of urine, carefully collected on Ward 4, filled the cold rooms. Bottles filled the shelves and most of the floor space. All the urine was laboriously hand-extracted by a team of technicians shaking huge separatory funnels. Now and then one was dropped.

Paul Zamecnik was soon joined by Ivan Frantz and a succession of talented and distinguished co-workers, including Mary Stephenson. His group continued to investigate the mechanisms of protein synthesis, given new impetus by the availability of radioactive isotopes, a spin-off of atomic research during World War II. A major contributor was Bob Loftfield, an expert chemist recruited from MIT. He synthesized 14^C-labeled amino acids.

No account would be complete without mention of Miss Tibbetts, an Episcopal nun and Dr. Aub's personal technician—a marvelous character much beloved by us all. No one else did Dr. Aub's calcium determinations. One day, in her gleaming, dust-free, calcium-free laboratory the ceiling began to shake and plaster full of calcium began to fall. Finally, a hole opened, a curley-haired Italian head appeared, looked around and said, "Mama mia! I got the wrong room!" and retreated, leaving chaos.

Following up his proposal to study normal growth, Dr. Aub began a collaborative study in the 1930s with George Wislocki, professor of anatomy at HMS, on the growth of deer antlers—a phenomenon which fascinated Aub. Here was normal tissue that grew at a stupendous rate, but under perfect control. At the antler base, histologically the tissue looked like an osteogenic sarcoma. It could produce up to 20 pounds of antler per season under the control of testosterone and hormones of the anterior pituitary. One cheerful animal, named Ichabod, grew antlers that looked like a clump of grass. A doe named Susie was quite bothered when *she* grew antlers.

There was a humane spin-off from this research. The struggle to inject deer led to the adaptation of an air rifle to shoot darts tipped with a curare-like drug, flaxedil, into the animal's hind quarters. This caused a minimum of pain and in a humane way immobilized the creature, allowing the laboratory people to carry out the necessary procedure while it remained quiet. The drug had a large margin of safety and could be rapidly reversed by tensilon, a specific antidote. Within seconds after its injection, the animal could move and in a few minutes would stand up and trot away. This technique for animal immobilization has been enthusiastically adopted by wildlife management the world over.

During my first Huntington year, Dr. Aub suggested that I treat tumor-bearing mice with weed killer. If it could selectively kill dandelions, perhaps it could do the same for cancer cells. Well, it didn't, but the mice developed a curious myotonia. You could stand their tails up and they would stand there erect. In 1946, the work was published and forgotten. Twenty years later, I began to get reprint requests—for the weed killer was 2,4-D, the active ingredient of agent orange.

In addition to deer antlers, Dr. Aub's other favorite model for studying normal growth was regenerating rat liver. Austin Brues had carried out several elegant studies before leaving the Huntington, and my assignment was to carry out his work on why the liver regenerates. That was in 1946, and now 40 years later, I'm still trying to find the answer.



Aub with Ted Nathanson, right

During the 1940s, when funds were scarce, we were called upon to publicize our activities. We went on television. Paul Zamecnik built a protein molecule with my help while Dr. Aub watched benevolently. There were cages of mice with tumors, shown very fleetingly because the sight would offend the sensitivities of the TV audience—pretty mild stuff compared to what turns up on the tube today. Ted Nathanson had to describe his work on breast cancer, but the words breast and mammary were censored and could not be used on television. He was hard-pressed to explain what on earth he was doing. How times have changed!

By 1951 the Huntington Lab moved again. The Domestic Building was demolished and we transplanted ourselves to the New Research Building—less colorful but far more comfortable and efficient. By this time, funding had gone to the other extreme. When I applied for a five-year research grant, they asked if I wouldn't really like it for seven. I didn't refuse.

Dr. Aub retired from the Huntington in 1956, leaving a research operation that was going full steam ahead. He reviewed the substantial impact the lab had made when he received the Bertner Award in 1956:

> In the last 10 years, we have been learning how to dissect the cell chemically, to see what parts are involved in different metabolic reactions, and in this way, to see how the reactions of cells of one organ differ from those of another. . .
>
> Paul Zamecnik and his associates . . . [have shown] how proteins. . . can now be made in homogenates, and the parts of the cell can be separated one from the other. . . . During the past year this group has learned much of the source of energy and the mechanisms of uniting amino acids into proteins.

Then he mentioned my work on liver regeneration and cholesterol synthesis, and Jesse Scott and Edgar Taft who were developing microtechniques for analyzing high-energy phosphorus compounds in microscopic tissue sections. Finally, he referred to Ted Nathanson's earlier work and Lew Engel's elegant studies on the metabolism of steroid hormones. Then he summed it up:

> The same tiny synthetic particles of the cell—microsomes—which have been found in Dr. Zamecnik's and Dr. Bucher's laboratories to be involved in protein and cholesterol synthesis, also now appear to be essential in the oxidation of the sterol side chain. We now begin to witness a unifying simplification in this development of our understanding of the growth machinery of the cell. The mitochondrion serves as the cell powerhouse, and the microsome emerges as the site where syntheses are carried out. . .
>
> The biochemist has a tendency to throw away the cell membrane in distaste for its refusal to permit access of his substrates to vital cell centers. Surely it deserves attention for its possible role in the poorly-regulated growth of the tumor cell. Therefore, I plan to devote much of my remaining years to the role of the cell surface in metabolic processes.

And that is precisely what he did. He set up a laboratory in the Warren Building and made an original observation that an obscure class of compounds, the phytohemagglutinins, caused extensive clumping of cancer cells, while normal cells are relatively unaffected. This seminal observation expanded into an explosion of interest in the cell surface. Paul Zamecnik has suggested that Dr. Aub's fascination with this previously neglected part of the cell stemmed from his early observations of the action of lead on the surface of erythrocytes.

Dr. Aub's impact as an investigator is of course only one aspect of this remarkable man. He died after a long illness at the age of 83. "Wit and wisdom are born with a man." That distillate of the obvious, handed down by a sage of the 16th century, is exemplified by Dr. Aub. He was surely a learned man, but you knew at once that the continuous welling up of ideas stemmed not from the dusty tomes of libraries, but from a native insight, transmuted by warmth and understanding, and a probing curiosity that gave them an alive, ingenuous quality quite lacking in book lore. He had a special gift, seeing straight into a problem, undeterred by the troublesome details that trapped lesser intelligences.

Not for him the clutter of details. He raised important questions and sought straight answers; "ifs" and restrictive clauses were brushed impatiently aside. Natural law, in his view, operated simply and directly. If the answers you found required too many qualifications, he thought them likely to be wrong. Curiosity, floating free, can lead to more colorful, if less productive, avenues. There was no compartmental thinking in his wide-ranging mind.

Weeding his garden he meditated upon pussley, that humble, ever-recurring nuisance familiar to all workers of the soil. What superb recuperative powers—could they be extracted to serve some restorative, therapeutic need? Next morning a bushel basket of the stuff was deposited in the laboratory with an exhortation to find its active principle. We loyally tried.



With Paul Dudley White, right

Enterprising lay people optimistically shipped crates of special Florida seaweed, or New Hampshire soil organically conditioned and complete with particularly energetic earthworms billed as far livelier than their inorganically conditioned counterparts. And there were other items too numerous to mention. All were courteously received, acknowledged, and when feasible, assayed for anticancer activity. No intellectual snobbery pervaded JCA's laboratory. Human values counted. One person's ideas might be as valid as another's.

Being interviewed for a job by Dr. Aub was a special kind of experience—not easily forgotten. Questions came from unexpected directions, catching you off balance; some were deceptively naive, some outrageous. It was deliberate, to get at what kind of person you were, but teasing too. If you weren't too intimidated to detect the barest hint of a twinkle, you might laugh and then you both shared the joke and the delight of a new found empathy.

There was something special about the way he saw people. He warmed to them, and they responded. It didn't matter that names escaped him; he knew who you were, what you were doing, and a great deal more. He cared about you, certainly, but there was an element of detached amusement over human foibles. Accepting a ride home was sure to be an experience; it generally required 30 minutes to an hour merely to leave the hospital, so numerous were the conversations with doctors, nurses, patients, visitors, maintenance, and mop-and-bucket men encountered en route.

The Huntington Lab was a happy place, pervaded by helpfulness, friendliness, loyalty, and fun—all generated and nurtured by our director. You had the feeling that he was sincerely in back of you and believed in your capability. He fostered togetherness.

On one occasion, a research fellow newly arrived from another country where matters were less free and easy, came to a picnic supper where we each showed 10 slides of our summer vacations. The young man was stunned to see the distinguished professor bring his own picnic bag, sit happily on the ground to eat it, and then evoke howls of laughter with his farcical account of his perilous ascent of Cadillac Mountain (by car), complete with photos of every stage of the ascent.

He quietly enjoyed life as it went along, all through the day, every day, whether working or playing, and it always made him late. He was never on time—ever!—maybe because he enjoyed each moment so much. His legacies are the many lives he touched and brightened, the brilliance of his science, and the creative investigators who under his successor, Paul Zamecnik, continue to push forward the frontiers of our knowledge of the inner workings of the cell. □

Nancy L.R. Bucher, MD, formerly a member of the John Collins Warren Laboratories of Collis P. Huntington Hospital at MGH, is now a research professor in the department of pathology at Boston University.



Huntington Hospital



Fifty Years On

Reflections From a Medical Class Reunion

by J. Russell Elkinton

Who are these old fellows with rounded figures, weathered faces, white locks, and bald pates, who cluster again so eagerly in the marble halls of HMS? Who are these men who might be cast by Shakespeare for the part of Falstaff in his old age?

> Have you not . . . a white beard, a decreasing leg, an increasing belly? Is not . . . your wind short, your wit single, and every part about you blasted with antiquity, and will you yet call yourself young?

Why these old men are our classmates of half a century ago who then were so lithe, so smooth-faced, so full of bounce! Today, some of them

ILLUSTRATION BY DAVID SCHUSTER

are identifiable from memory, but others require that darting, surreptitious glance at the name label. Nevertheless, all of us are glad to be here, however shaken by such obvious evidence of the passage of time.

This is our Harvard Medical School Class of 1937 holding its 50th reunion. It is a happy yet oddly moving occasion, one that is conducive to a certain amount of musing and reflection.

Not all of us are on hand. Of the 139 members of the class who graduated, 44 have already gone to the happy hunting grounds, and an equal number are present at this reunion. Of these, only one is in a wheelchair, a few are partially supported by canes (and/or wives), and the rest are on their own two feet and—if not actually bouncing—at least bright-eyed and cheerful. But I doubt if any of us "yet call ourselves young."

We followed the traditional ritual of an HMS reunion: Alumni Day morning program; luncheon in the tents (dripping, as usual, around the edges); class dinner in the evening; clambake the next day. The Alumni Day morning speeches were good, but the class dinner was the heart of the reunion. This was held in the Union Club on Park Street, close under "the State House dome of dirty chrome," so designated by Fritz Irving years ago in that epic known to us all, the "Ballad of Chambers Street."

The evening's proceedings were handled adroitly and informally and the atmosphere was convivial and heart-warming as old friendships were renewed. Wives were admired and appreciated for the sparkle they gave the occasion. Class Agent Jack Nunemaker made the usual plea for annual contributions to the alumni fund, holding out the carrot of pecan nuts from his farm in New Mexico ("shelled if in four figures"). Jack also exhibited the 1937 class gavel, made from a plane tree similar to that of Hippocrates, and formerly held by our deceased class president, Joe Johnson. This symbolic relic is to be held in escrow by the medical school for the Class of 2037; may the school do as much for them in their century as it has done for us in ours.

The high point of the evening was provided by our class man-of-letters, poet, essayist, etymologist, biologist, and physician-extraordinaire—Lewis Thomas. Lew arrived late ("35-minute flight up from New York, hours in from Logan"), but his delightful talk met his usual high standards of wit, simplicity, and insight.

He began by characterizing that very short period between graduation from medical school and the beginning of internship as the one time in our lives when we thought we knew everything about everything. Since then, it's been downhill all the way as we've learned less and less about more and more. On the negative side, Lew listed certain subjects he had never understood and never wanted to understand: the Federal Reserve System, tax simplification, space-time (though he surely knows more about this than the rest of us). He also had a few subjects on the positive side about which he hoped to learn more—viruses, for example.

Over the 3.5 billion years of the evolution of life on this planet, Lew explained, the major function of viruses could hardly have been to produce diseases in man. Given to sneaking alien bits of DNA into unsuspecting genes, perhaps viruses were a factor in the whole process of evolution. Next time you have a cold, just think that, perhaps in some small way, evolution is being aided onward (if not upward); Lew Thomas was at his best.

Lew's poems from the very beginning of our medical school days remain in the minds of his classmates. His "Allen Street" was published in our yearbook and recently republished in *The Youngest Science*, his fascinating and partly autobiographical account of medicine over the last half-century. Back in medical school, we all knew "Allen Street" by heart. At the end of our reunion dinner, as some of us were going down the elevator, we found ourselves intoning in unison excerpts from that favorite poem—to the astonishment if not delight of the accompanying wives.

Little Mr. Grico, lying on Ward E,
Used to have a rectum, just like
you and me—
Used to have a sphincter, ringed
with little piles,
Used to sit at morning stool, face
bewreathed with smiles. . . .
But in the night, far out of sight,
within his rectal stroma,
There grew a little nodule, a nasty
carcinoma. . . .
Where is this patient's other half!
Where is this patient's seat!
Why, Doctor, don't you recollect:
It's gone to Allen Street.

* * *

But let us speak of Allen Street—
that strangest darkest turn,
Which squats behind a hospital,
mysterious and stern.
It lies within a silent place, with
open arms it waits
For patients who aren't leaving
through the customary gates.
It concentrates on end results, and
caters to the guest
Who's battled long with his
disease, and come out second
best. . . .
And there he'll find a refuge
kind, a quiet sanctuary,
For Allen Street's that final
treat—the local mortuary.

I doubt if members of the Class of 1937 are now quite so blithe as they used to be about "that final treat—the local mortuary." Too many already have come out second best in their battles with the Grim Reaper, and quite a few more are currently engaged in vigorous combat.

The little red book of updated biographical information shows a surprising amount of detail about these battles of ours. One classmate is reported to be blind, several others to be devastated by Alzheimer's disease, many have surmounted all sorts of surgeries and illnesses, or are playing host to various orthopedic or cardiovascular prostheses.

Our class agent reports that he has been "ophthalmoscoped, otoscoped, cystoscoped, sigmoidoscoped, gastroscoped, and bronchoscoped"—no malignancy found. All that's left to be explored is his umbilicus which, if done, would be "a *navel* operation requiring a periscope!" We all know that becoming a patient makes a doctor a better doctor, more sensitive to the ordeals of his patients. Perhaps some of these ordeals of our medical classmates have come too late for the benefit of their patients.

From the little red book and from conversation at the dinner, one catches glimpses of other struggles: one wife whose prolonged dying from cancer was "unmitigated hell," another wife who succumbed to Alzheimer's disease early in middle life, another struck by intractable depression, children handicapped or lost, and no doubt there have been other agonies endured but unrevealed. These are experiences to be found in any half-century sampling of any portion of the population, experiences that make us one with our patients and with all humanity.

But our class survivors, on the whole, show themselves to be an enterprising, cheerful lot. Although the majority have retired from professional

life, many go on teaching and consulting to a limited extent. Most have traveled widely—no corner of the earth seems immune to a visit from some member of the Class of 1937. One classmate has visited China to pass on up-to-date surgical techniques in ophthalmology, another had taught pediatric surgery in India. The variety of hobbies pursued has been astounding, ranging from gardening and farming to boat-building and private-plane flying, from tennis and golf to hypnosis and genealogy, from music and painting to writing and archeology in the Andes. Versatility all the way!

Some have been explicit in stating their philosophical outlook. One classmate declares that, "As far as I'm concerned, the basic philosophy of three score years and fifteen should be *acceptance*"; he does not reveal the "slings and arrows" that led him to this conclusion. Another states that "creative work is therapeutic and I dislike rest intensely," a point of view borne out by the long list of his ongoing professional activities. Another quotes the creed, "Lord grant me the Serenity to accept the things I cannot change, the Courage to change the things I can, and the Wisdom to know the difference." One classmate states, "Know yourself, be true to yourself, forgive yourself and others, and trust God in all things." Half a century of adult living tends to make a person thoughtful.

Beyond personal sorrows, beliefs, and faiths, some members indicate their worries about the wider world. One is "appalled at the lack of integrity in our culture, be it government, business, or professions," but remains "a solid, happy, usually optimistic guy." Another is concerned about "a political system that assures deficits." To others, the threat of nuclear war is a major anxiety that leads to participation in organizations such as Beyond War and Physicians for Social Responsibility. The needs for effective "preventive medicine" run wide and deep.

So where have we been during the 50 years since we were exposed to "giants?" These giants, of course, were our teachers such as Hans Zinsser, Robert Green, Walter Cannon, Otto Folin, John Enders, Fritz Irving, Henry Christian, Joseph Aub, Fuller Albright, Oliver Cope, James Means, William Castle, Henry Jackson, Soma Weiss, Herrman Blumgart, James Gamble, Alan Butler, and many others who launched us into our professional lives.

In these subsequent 50 years—ranging from World War II and the introduction of the Atomic Age through the Vietnam War to the present vagaries of the Reagan administration—we have lived through, and participated in, the greatest advance of medicine in history. The very first antibiotic, sulfanilamide, appeared in the U.S. for therapeutic use only in our last year of medical school. As interns, we spent nights subtyping pneumococci to give antiserum to our patients with pneumonia—penicillin was yet to come. Neither had isoniazid arrived; we still were pumping air into pleural cavities to collapse tuberculous lungs.

We have lived through, and participated in, the greatest advance of medicine in history.

But those ancient days and antique ways were numbered. Antibiotics arrived and multiplied and so did myriads of potent therapeutic drugs (often two-edged swords). Precise therapies with blood, fluids, and electrolytes were devised, hemodialysis was invented and deployed, and transplantation of organs was achieved. Open-heart surgery, coronary bypass, artificial replacement of hips, knees, and other joints—these and many other techniques produced benefits against an increasing number of ailments for an expanding number of patients.

Such therapeutic advances rested squarely on discoveries in the basic sciences, including biochemistry, immunology, physiology, and genetics, and on the growth in our understanding of the pathophysiology of human diseases. To these were added the rapidly expanding fields of neuropharmacology, psychology, and psychiatry. In all these developments, our classmates have participated—some as scientists and investigators, many as teachers, and almost all as purveyors of the fruits of medical science to the patient.

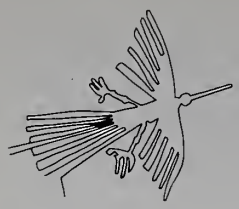
But what of patient care? The greatest accomplishment of the Class of 1937 (like that of other classes) is that it has taken care of an uncounted number of sick people. But sadly, over our lifetime the public's perception of our profession has deteriorated. No longer is the doctor viewed as trusted caretaker and friend. Instead, the doctor is seen increasingly as a money-oriented technologist whose services—especially in the hospital—are far too costly and who has too little time to empathize with the patient as a person.

This high-cost, low-empathy image worries us. Have we outlived the credo we learned in medical school which lies at the heart of our profession: "To cure sometimes, to relieve often, to comfort always"? Have we forgotten Francis Peabody's aphorism: "The secret of the care of the patient is in caring for the patient"? We hope not. Will the next generation absorb and act on these words of wisdom? We hope so.

Where are we going? The answer for the human race and for the whole planet is, to say the least, uncertain. Will the biosphere survive the recent arrival of that contentious species *Homo sapiens* with its exploding population, its pollution and destruction of the environment, and its ingenious unlocking of the power of the atom? Will social and political common sense, ethical values, and spiritual insights prevail? Our hopes and fears on this ultimate issue fluctuate from news report to news report, from day to day, year to year. What will be the fate of this extraordinary and mysteriously created universe of which we are so fleetingly a part? We don't know.

Where is the Class of 1937 going? For each of us personally the answer, sooner or later, will be, "to Allen Street." But the journey ending in "that final treat" has been a good one, a very satisfying one, a greatly privileged one—all stemming from the fact that 54 years ago we entered Harvard Medical School. Perhaps at times in our long journey since then we have caught an occasional whisper of what E.B. White, in speaking of Thoreau, says so few ears hear: "the uninterrupted poem of creation, the morning wind that forever blows." I think that at times we *have* heard it. I know that we don't want it interrupted. Carry on, HMS. Over to you Class of 2037. □

J. Russell Elkinton '37 is emeritus *professor of medicine at University of Pennsylvania and editor* emeritus *of* Annals of Internal Medicine.



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